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THE BRICKBVILDER

VOLUME XXV NOVEMBER, 1916 NUMBER 11

The Dome of St. Paul's, London

A STUDY OF ITS STRUCTURAL SYSTEM

By RICHARD FRANZ BACH

Curator, School of Architecture, Columbus University

AS compared with the long and turbulent structural history characterizing the building of S. Maria del Fiore and of St. Peter's alike, the record of St. Paul's offers a pleasant relief. Untold experiments, indecision, intrigue, and the cumulative success due to the efforts of a series of controlling hands are not here to be found, for the building as it stands is the work of a single architect who, within the space of thirty-five years (1675–1710), laid its first foundation block and saw the last stone of the lantern set in place; as Elmes writes, it was done by Wren "alone and from his sole productive mind; whilst St. Peter's was the work of more than twenty architects, supported by the treasure of the Christian world, and the power of the Roman Pontiffs in their most powerful days and during the reigns of nineteen successive popes."

Before 1675 Inigo Jones had restored the building, retaining the Gothic for its body but favoring its front with a curiously alien portico in "the better Roman manner," called Palladian, and reluctantly making every necessary concession to the usual nave, aisle, and clerestory section behind it. Later efforts had likewise been made on the part of a commission of four, including Sir Christopher Wren, to repair the damages caused by Puritan desecrations, — horses having been stabled in the choir and extensive injury caused throughout. The fire of 1666 which razed the major portion of the then city area of London, did not spare St. Paul's, and destroyed likewise a large number of churches, public buildings, guild halls, and the like, all of which (not to mention the replanning of the entire city) Wren undertook to replace, in his capacity of Surveyor-General of His Majesty's Works. An amazing volume of work passed through his hands, although his architectural experience was limited and of recent acquisition and his training had been that of a mathematician and astronomer, he having held a professorship in the latter subject at Oxford.

The restoration of the church after the fire was found inadvisable and Wren was required to prepare designs for a new cathedral, which, according to the *Parentalia** occasionally to be quoted herein, was to be "a Fabric of moderate Bulk, but of good Proportion; a convenient Quire, with a Vestibule and Porticoes, and a Dome conspicuous above the Houses." The architect had long favored a domical crossing, even for the restorations of the old edifice and his first design presented a Greek plan type with this feature at the crossing, the main portion of the edifice preceded by a narthex suggested from San Gallo's plan for St. Peter's. The wall is brought out in each of the angles formed by the arms to a reëntrant curve terminating in the adjacent corners of the arms. The dome in this design rests upon a circular drum bearing upon eight piers, the angles in the plan behind the curved walls mentioned above being covered with small domes. For one-fourth its height the heavy drum is plain, but in its main portion is treated as an arcaded gallery, the arches resting on piers against which appear Corinthian pilasters. Above the entablature of the latter simple reversed consoles carry the line of each pilaster backward to the spring of the dome on whose outer surface are a series of rib motives, having no connection with its construction. The spring of the dome is weighted by means of a variant of the buttressing mass seen in the Roman Pantheon, rising to the haunch of its semi-circular dome, and likewise indicated in Bramante's dome scheme for St. Peter's. This continuous anchor buttress is disposed as an attic, its frontal plane far behind that of the drum, the dome within springing, however, from a much lowel level. The dome itself was designed to be solid up to about one-fourth its altitude; above that two shells were projected, the inner semi-circular and abutting against a large oculus, the outer of very pointed section and bearing a peristylar lantern.

Wren took ample care to avoid the errors manifested in St. Peter's, although the chief difficulties of the latter were not brought to light until after his death. His projected inner shell was given adequate support and counterthrust by his retention of a single shell up to such a high level, while the high section of the outer shell minimized its own thrust, as the Florence dome had demonstrated.†

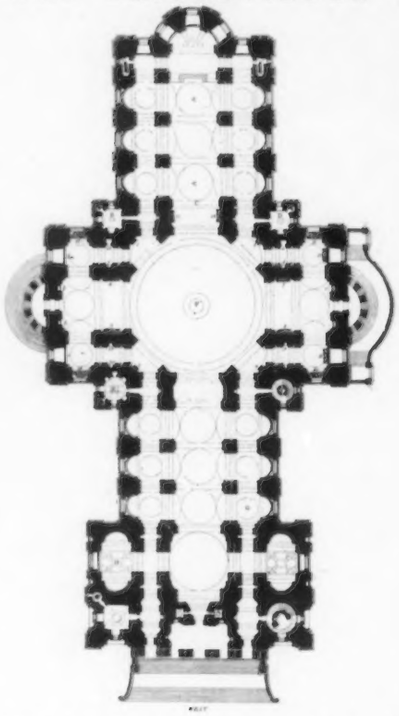
The mass of the drum, which is not to be construed as a solid, is thicker at the top than at the bottom, due to the sloping inward or batter of its inner face, forming on its interior a truncated cone which further operates to reduce the dome thrust. Throughout it will be seen that Wren kept the problem and solutions of Bramante and Michelangelo in Rome constantly before him, probably through the agency of Serlio's *Architettura*, since he had never traveled in Italy. Michelangelo's three shells, as shown in his model previously discussed,† Wren proposed to reduce to two by eliminating the middle instead of the inner

* See Bibliographic Note.

† See THE BRICKBVILDER for August, 1916 and October, 1916.

as was done in the final execution of St. Peter's. His two shells were also designed to rise to their crowns independently, without bonding ribs.

As was the fate of Bramante's and Michelangelo's favored Greek cross plan for the Roman church, Wren's first design was set aside because it deviated too much from "the old Gothick form of Cathedral-churches." Much disgruntled, Wren set to work on another design which was to accomplish the desired reconciliation of styles old and new, "to reconcile, as near as possible, the Gothick to a better Manner of Architecture." His new design, which was the result of a series of detailed studies, presented an elongated nave and choir, but not truly a Latin cross plan, since the transept remained near the middle. A most remarkable and inexplicable feature appeared at the crossing, however, a combination of dome and spire in the form of a truncated dome surmounted by a drum bearing a smaller dome of oval section,



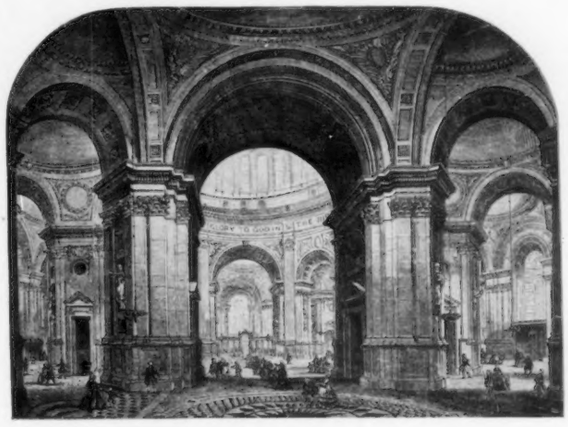
Dome of St. Paul's, London. Plan of Cathedral
(*From Dugdale*)

this in turn forming the base for a spire in six stages. The motive is unusual in the extreme and seems not to have been favored with a satisfactory explanation at any time as to the architect's real meaning. It seems an egregious heaping up of elements in given lengths, seemingly as they came to hand and lacks the good reasoning of Wren's otherwise accurate perception. Yet this design was granted approval of King Charles II, but with the happy proviso that, when the work was under way, Wren might "make some variations, rather ornamental than essential, as from time to time he should see proper." The construction to be placed upon the word *ornament* being as wide as the limits of art, it is seen at once that the architect was given considerable freedom. The present cathedral is the executed work based upon this "warrant" design, alterations therefrom were made "on the job" by the designer who personally supervised all aspects of the undertaking, and freely availed himself

Dome of St. Paul's, London. View of Cathedral from Southwest

of the liberty offered in the rider to his warrant of approval to make such changes as he deemed proper.

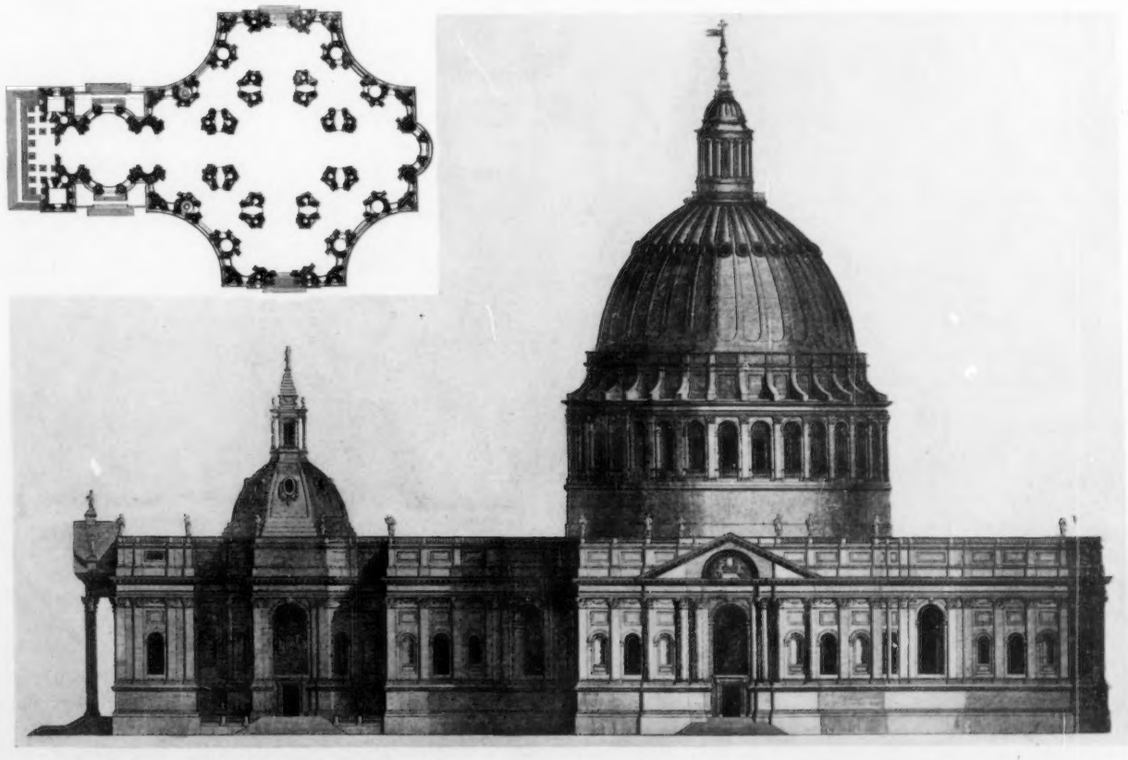
As we have it, St. Paul's dome presents a novel structural system, evidently the work of a painstaking and studious master, its elements traceable in a number of its predecessors but having itself no definite precedent. Taken at their full value, regardless of other faults — such as "barbaric combinations" of Gothic and Renaissance motives in ornament — all of Wren's buildings manifest similar concentration.



Dome of St. Paul's, London
Interior of Wren's First Design at Crossing. (*From Longman*)

The executed dome rests upon a substructure consisting of eight piers (all of which together have an area less than that of one in St. Peter's, Rome) connected by cross arches, those on the principal axes being semi-circular and those on the intermediate axes segmental, and surmounted by a section of wall and another suggested supporting arch to attain a uniform height and similarity of structural effect on all sides of the basic octagon. The disposition of this group of archivolts was rendered necessary by the octagonal crossing as based upon piers at all angles; its use may have been suggested from a similar arrangement in the Octagon of the Cathedral of Ely, of which Wren's uncle was Bishop, and has been the subject of much critical discussion, because of the manner in which its segmental cornice intersects the horizontal cornices of the piers upon which it rests; although, of course, the continuation of the horizontal cornice in its present form was imperative for the pilaster order beneath, and an arch of full height and consequently of proper treatment at its spring was not possible on the diagonal axes of the octagon. The example at Ely, being Gothic, had all the advantages offered by the flexibility of the pointed arch, which makes possible a grouping of a number of arches of different spans, yet achieving a uniform height at their crowns or apexes.

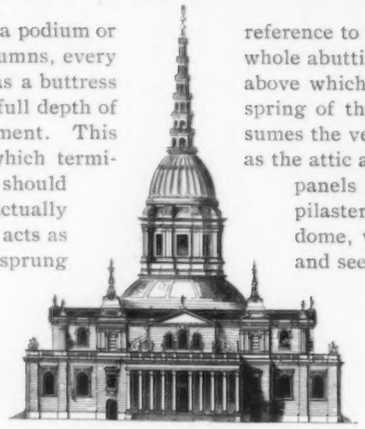
The drum rises directly above the arches in the form of a double wall. Of this the outer member is treated as a simple surface with small unframed windows necessary for light only to a height of about 50 feet, of which at least half is concealed by the timber roofing of nave and transepts.



Dome of St. Paul's, London. Elevation and Plan of Wren's First Design for Cathedral. (*From Loftie*)

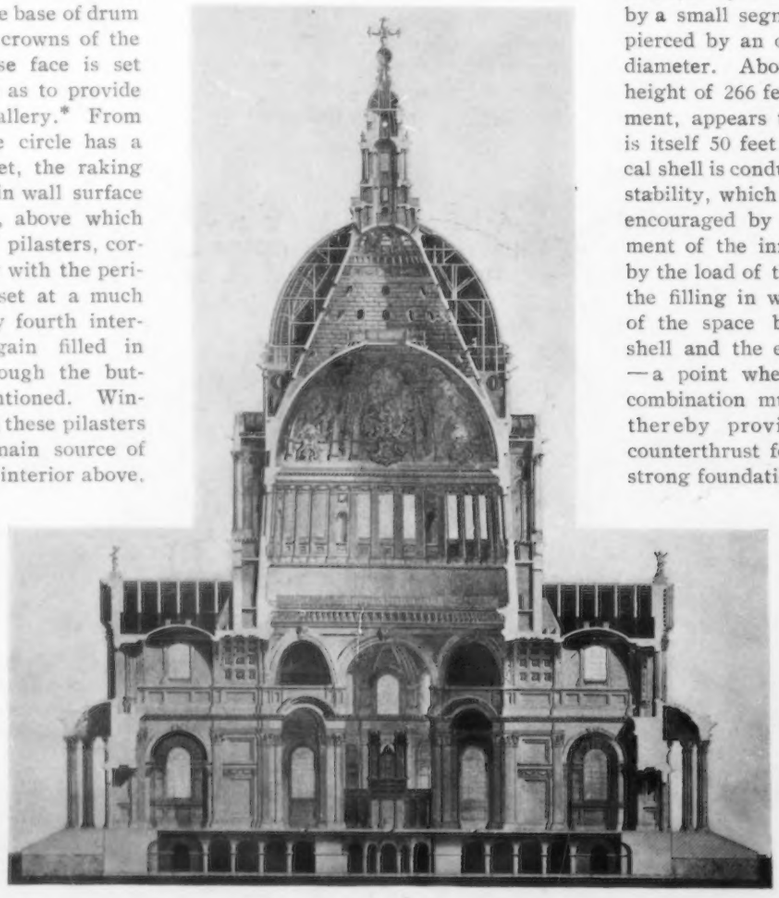
In exterior treatment this stage serves as a podium or base for a Corinthian peristyle of 32 columns, every fourth intercolumniation being filled in as a buttress of square plan extending back into the full depth of the drum and with exterior niche treatment. This order is surmounted by a balustrade which terminates the outer wall of the drum. It should be added that each of the columns not actually included in the buttress motives really acts as a minor buttress itself, since an arch is sprung behind each from pilasters of about one-third the height of the peristyle and walls are built above these arches to the level of its cornice. Metal ties are placed, respectively above each of these small arches and at the entablature level, their inner ends anchored in the inner dome shell.

The inner wall of the drum is built in the form of a frustum of a cone so that all its motives slope inward or are given a batter (amounting to a difference of 8 feet between its lower and upper diameters) as they rise from the heavy cornice indicating the base of drum (directly above the crowns of the great arches) whose face is set back to such depth as to provide ample space for a gallery.* From this cornice, whose circle has a diameter of 110 feet, the raking drum rises as a plain wall surface for nearly 20 feet, above which appears an order of pilasters, corresponding radially with the peristyle without but set at a much lower level. Every fourth intercolumniation is again filled in solid carrying through the buttresses above mentioned. Windows alternate with these pilasters and provide the main source of light for the dome interior above, which rises in slightly oval section from the entablature of the interior order. This dome forms the inner shell, 18 inches thick, built of brick with bonding courses at 5-foot intervals consisting of special brick 18 inches long laid with reference to the hypothetical radius of the dome, the whole abutting against the rim of an eye or oculus above which has a diameter of 20 feet. From the spring of this shell the inner wall of the drum resumes the vertical again and appears in the exterior as the attic above the peristyle, treated as a series of panels with windows over, alternating with pilasters. Upon the attic is built the exterior dome, which apparently rests directly upon it and seems to support the lantern, but which is in reality a monumental piece of deception, consisting merely of a domical surface of wood and lead with fine contour, borne upon a stout oak skeleton. Neither this dome nor the much stronger inner shell have any structural work to do, forming part of an æsthetic rather than a structural system.



Dome of St. Paul's, London
Wren's Accepted Design and Royal Warrant
(*From Longman*)

The work of supporting the lantern falls upon an intermediate invisible shell in the form of a brick cone rising with an even thickness of 18 inches from a point near the haunch of the inner dome, its apex cut off and replaced by a small segmental stone dome pierced by an opening 12 feet in diameter. Above this point, at a height of 266 feet from the pavement, appears the lantern, which is itself 50 feet high. This conical shell is conducive to the utmost stability, which quality is further encouraged by the conical treatment of the inner drum assisted by the load of the lantern, and by the filling in with solid masonry of the space between the inner shell and the exterior attic wall, —a point where two thrusts in combination must be resisted, — thereby providing substantial counterthrust for the former and strong foundations for the conical shell which really has its base in this filling. A series of thirty-two spur walls, which may also be called buttresses, are built inward from the attic wall to the base of the cone. These are perforated to provide for passages; their weight adds to the counter-



Dome of St. Paul's, London. Cross Section Through Dome and Understructure of Present Edifice
(*From Britton*)

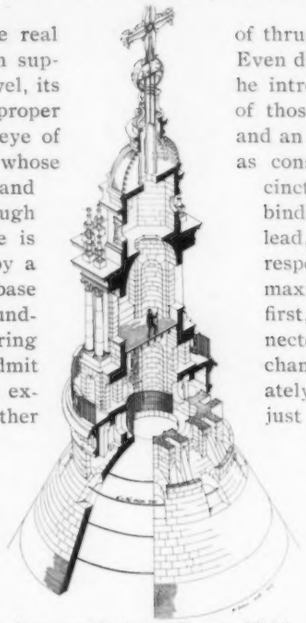
*The so-called Whispering Gallery.

thrust before mentioned and they form the real foundation for the outer dome, whose main supporting timbers have their bases at this level, its secondary supports resting upon corbels at proper levels in the cone surface. Between the eye of the cone and the inner dome there is a void whose height is 50 feet, as measured at the crowns, and which obtains its light almost solely through the oculus of the inner shell. The cone is pierced by three rows of oval loopholes, by a series of larger arcuated openings at its base behind the windows of the attic and by round-headed openings at top just beneath the spring of its segmental dome. These openings admit light also to the interior of the deceptive exterior dome, which is itself lighted by a further series of openings just under the lantern.

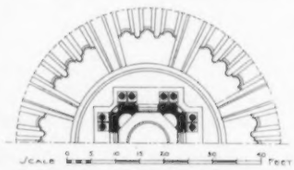
The lantern is again constructed as a double wall. The inner, cut by arches at its base, rises as an octagon around the eye of the cone and is covered with an octagonal cloistered vault, whose crown is again cut off to form a smaller eye at a height of about 36 feet from the cone. Above this vault rises an attic supporting a still smaller dome and finial in the usual combination of ball and cross, the total exterior height of the whole being 340 feet.

The outer wall receives more varied treatment. A platform is built directly above the crown of the outer dome upon a double wall, its inner member resting upon arches bearing upon the haunch of the vault over the cone, its outer portion supported upon a corbeled shelf built out from the cone surface at the sill level of its uppermost row of openings. Above this platform a simple block of Greek cross plan, treated with niche motives on the ends and sides of its arms, except on its major axes where openings appear, serves as base for a peristyle consisting of coupled columns flanking tall rectangular openings. The entablature of this smaller Corinthian order terminates the exterior wall of the lantern.

Wren well knew the limitations of all freestanding domical structures in which great height is attempted and the full sweep of contour must be visible, at the expense of frankly expressed buttressing features. Hence his use of the tallest vaulting section possible for his main support, the cone, whose line of thrust most nearly approximates the vertical. Even distrusting the final stability of this feature, he introduced in the cone — much to the distress of those who insist upon candor in construction and an absolutely true equation of material forces as construed by the spectator — four composite cinctures, each comprising a belt of stone as binding course, containing a chain run in with lead, while two additional chains were inserted respectively at the spring and at the level of maximum thrust. Further cinctures appear, first, in the form of a heavy double chain, connected in ten foot sections, run with lead in a channel located near the outer wall immediately below the springing of the cone and just outside its circle of pressure; and, secondly, in a lighter double chain set behind the attic cornice.



Structural System of Crown of Brick Cone Showing Section of Lantern



Dome of St. Paul's, London
Plan of Lantern

From these various indications it will be seen that although Wren saw fit to depart from the so-called warrant design to the extent of entirely altering his chief motive (not to mention important changes elsewhere in the structure), he was prompt to hark back to his first rejected design in certain particulars, while retaining in great measure the height, required to make his edifice "conspicuous above the houses," seen in the executed dome. In the *Parentalia*, we find, in explanation, the words, referring to domes: "The age had been so used to steeples that these round designs were hardly digested unless raised to a remarkable height," and again: "The old church having had before a very lofty spire of timber and lead, the world expected that the new work should not in this respect fall short of the old (though that was but a spit and this a mountain). He was, therefore, obliged to comply with the humor of the age and to raise another structure about the first cupola, and this was a cone of brick, so built as to support a stone lantern."

Dome of St. Paul's, London. Interior of Present Cathedral
(*From Engraving by John Coney in Dugdale*)

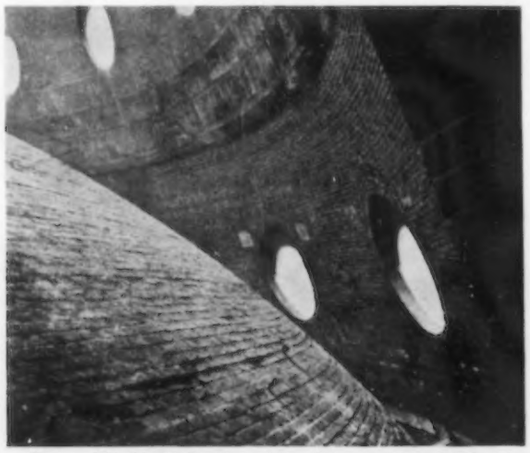
Precedents in Wren's case differ decidedly from those to which Brunelleschi, Bramante, and Michelangelo had ready access. Having never visited Italy, Wren could have been acquainted with St. Peter's only through the published works of Andrea Palladio or Sebastiano Serlio. It may have been noticed that his designs give evidence of careful study of the solutions used in the Roman Pan-

theon and in St. Peter's; his final exterior treatment, furthermore, drum and attic and dome in their essential proportions recall the Tempietto by Bramante standing in the courtyard of S. Pietro in Montorio on the Aventine in Rome, and this also he could have seen in either of the authors mentioned. He had spent six months in France, however, during the plague in London in 1665, but Lemercier's dome at the Sorbonne was the only monument of domical construction available for his purposes in the regions which Wren visited. He could not have seen the dome of the Invalides, built by Jules Hardouin Mansard, the construction of which occupied the years 1680–1706, although it is barely possible that this architect might have shown him sketches of his projected work so many years in advance, for he met Mansard in Paris. He may also have seen sketches of this and other domical works in the hands of travelers from France and Italy while he himself was in London. The Panthéon of Soufflot was not built until 1764, fifty-four years after Wren's work was completed and thirty-two after his death. Wren's solution, regardless of the "fraud" in church and dome alike at which purists have railed, must be considered as distinctly his own conception. It has been construed by critics as the work of the mathematician who made sure of the stability of his work and then clothed it as the eye dictated with an exterior conformable to popular demand and the requirements of style in the design in hand. No doubt he was of those who feel that the essential harmony of construction and design must not be permitted to hamper too seriously either construction or design, and that occasionally success must be bought, — however little certain of us approve of the sacrifice, — at the expense of a modicum of architectural morality. For this general question of ethics in æsthetics we have here no space. Suffice it to say that the visible result, which alone concerns us at the moment, though lacking in a degree of majesty, has yet a decided sublimity and enviable dignity, that though its harmony of exterior lines may be in a degree obtained by false pretenses, its structural system merits the utmost praise as its stability throughout two centuries fully attests.*

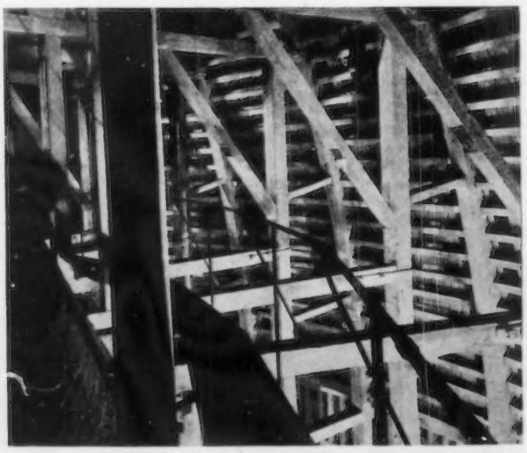
Tempietto of Bramante in S. Pietro in Montorio, Rome

Bibliographic Note. The brief compass of this paper has made it impossible to cover in detail the numerous points of interest in the history and criticism of this dome, and, therefore, to facilitate more extensive research the following list of references is given for those interested: Blomfield, History of Renaissance Architecture in England, London, 1897; Britton, The Fine Arts of the English School (essay by Aikin), London, 1812; Dimock, The Cathedral Church of St. Paul, London, 1901; Dugdale, History of St. Paul's Cathedral, vol. 2, London, 1716; Elmes, Sir Christopher Wren and His Times, etc., London, 1852; Fergusson, History of the Modern Styles of Architecture, vol. 2, London, 1891; Gilbertson, St. Paul's Cathedral, London, 1902; Loftie, Inigo Jones & Wren, etc., New York, 1893; Longman, History of St. Paul's Cathedral, London, 1873; Milman, Handbook to the Cathedrals of England, St. Paul's, London, 1879; Milman, Sir Christopher Wren, London, 1911; Moore, Character of Renaissance Architecture, New York, 1905; Simpson, History of Architectural Development, New York, 1905; Wren, Parentalia, or Memoirs of the Family of the Wrens, London, 1750; also various articles in the Journal of the Royal Institute of British Architects for 1907, and in the Architectural Review (London) for 1914.

* Barring, of course, the weaknesses latterly examined and found to be due largely to the settlement caused by the vibration of the underground railways and the use by Wren of stone inferior to that specified, because of difficulty of transportation and the almost pardonable professional sin of desiring to assure the completion of the entire edifice during his own lifetime.



Dome of St. Paul's, London. View Between Inner Shell and Brick Cone



Dome of St. Paul's, London. View Between Brick Cone and Outer Dome

(*From Architectural Review, London*)

View on Park Avenue Looking South Toward Grand Central Buildings

"From Twenty-Third Street Up"

II. 42D STREET TO 59TH STREET

By AYMAR EMBURY II

QUITE the most interesting part of New York to-day is the district between 42d street and 59th street, and between Park avenue on the east and Broadway on the west. Eight or nine years ago this was a dull, little frequented, and shabby portion of the city, except for the residence district along Fifth avenue and in the side streets immediately adjoining, which at that time was the most "exclusive" residential section of New York. A large part of it was restricted property, and the balance, because of the restrictions, appeared unlikely to become anything else but residential property. So settled was the apparent character of the district that the Kane House at 49th street and Fifth avenue, unquestionably one of the most beautiful private houses in New York, was built less than ten years ago, while a number of other houses of smaller size, but of equal interest, were constructed at about the same time.

The first invasion of the district was a sort of flanking movement up Broadway; some of the theaters were built above 42d street, and their location was invariably commented on as being out of their proper district, and inaccessible. Following the theaters, moved the Tenderloin, and with the real Tenderloin moved the gay restaurants, the cabaret shows, and dancing places, which, outside the lower circle of Tenderloin life, constitute a sort of *demi-monde* of their own.

Yet so sudden and so complete was the change in the location and physical character of the buildings provided for the amusement of the so-called theatrical and sporting sets that we are accustomed to think of the "Great White Way" as an old established institution, whereas as a matter of fact it was only about five years ago that the two popular songs, "Give my Regards to Broadway" and "There is a Little Street in Heaven that they call Broadway" were written and sung; both of these songs, of course, referred to the Broadway around and above 42d street.

42d street itself has probably changed in character more than any other single street in New York; it used to be a rather shabby horse-car street, through which one often passed but never got off—there was nothing except the Grand Central Station to get off for. To-day the Police Department of New York reports that more people cross 42d street and Fifth avenue than any other street intersection in the world, and traffic at 42d street and Broadway is almost as dense. This has been due to several factors: the first being the subway, with an express station at the Grand Central and a local station at 42d street and Broadway; second, several big hotels were built directly on the street and a number of others built so close to it that it became the most convenient artery of travel to and from them; third, a number of the theaters moved into the block between Seventh and Eighth avenues, because this block contained the most accessible cheap property near Broadway, and that block now contains about a dozen theaters. In addition to these changes one of the largest department stores, Stern Brothers, moved from the south side of 23d street to the north side of 42d street, a location midway between Fifth avenue and Broadway, where traffic is dense and transportation convenient. None of these buildings, with the exception of the group around the Grand Central Station, has been of particular interest, although the Times Press Building is far from being a poor example of

View Looking North from Corner of Vanderbilt Avenue and 42d Street

the office building type. The greatest development adjoining 42d street has, however, been around the Grand Central Station.

When the officials of the New York Central Railroad decided sometime ago that more space was necessary for their terminals, they realized that with electric locomotives, tracks need no longer be open, and that space above the ground was as valuable with tracks below as without them. They therefore purchased whatever property was necessary for the construction of their terminals, and as the tracks have been completed, have erected, one by one, large, and in general, handsome structures around the northerly continuation of Park avenue. The station is in itself somewhat disappointing, and the buildings around it do not quite measure up to the opportunity which was presented; but they, nevertheless, form a stately, handsome, and reasoned group, in which the cornice heights have been kept the same, and the scale and proportion of the architecture have been likewise held. It has therefore been most satisfactory and of great additional value in showing how interesting and picturesque a grouping can be made from buildings of the same general character. The view from 42d street, for example, looking up Vanderbilt avenue, shows this extremely well. The station is in sharp perspective at the right; at the left is a low office building of the same general character and of the same height; beyond, covering the next two blocks, are the Biltmore Hotel, the Vanderbilt Concourse Building, and the Yale Club, on all of which the cornice height of the station has been recalled by a band course, while the heights of the buildings themselves have been kept the same. The treatment here is admirable in itself and splendidly thought out.

Perhaps the most interesting view of the station, and one which is little noticed, is that looking down 43d street from Fifth avenue toward the carriage entrance, with the Biltmore Hotel at the left and office buildings at the right. The simplicity and dignity of the station from this point of view is not equaled by its more pretentious façade.

From the north, looking south on Park avenue, an even more interesting grouping of buildings is seen. It is the only open space in New York flanked by large buildings of essentially similar character, and while it might be more desirable to have more of the city so developed, the apparent restfulness of this open space is increased by contrast with the usual heterogeneous design in our adjoining buildings. The change in the character of Park avenue is only what must be expected. It is the main artery between two excellent portions of the city, and when the nuisance from the smoke filled tunnel of the New York Central Railroad was done away with, it was

Office Building, Vanderbilt Ave., Opposite Grand Central

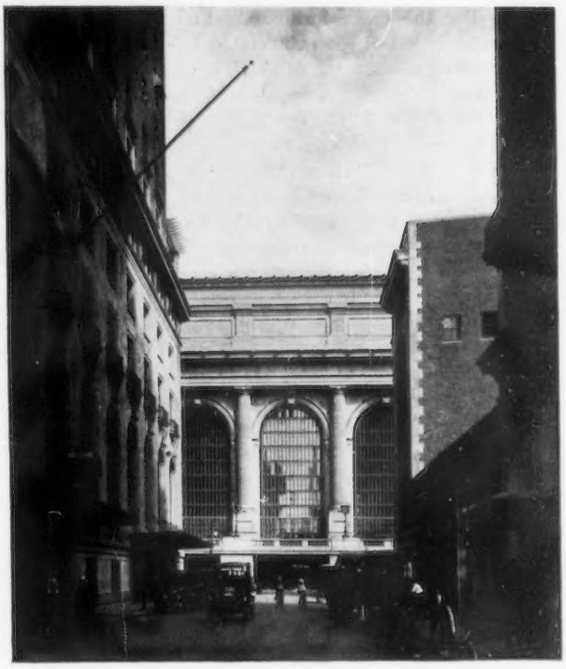
Detail of 42d Street Facade of Grand Central Terminal

Warren & Wetmore and Reed & Stem, Associate Architects

inevitable that it should become one of the fine residence streets. But since "residence" in New York means "apartment," the buildings facing on it are for the most part apartment houses of approximately equal height and, though designed by various architects, of generally similar scale and proportion. A few shop buildings have crept in, one of the most interesting being the new Hayden Building at 57th street designed to house the activities of this firm alone.

The upper fifties are the streets which appear likely to become the center of the club district. The clubs in New York have been steadily moving farther and farther north, and while the University Club was for many years a solitary outpost at 54th street and Fifth avenue, it is now no farther north than many of the others. The pleasant new building of the Calumet Club is on 56th street, just west of Fifth avenue; the new building of the Knickerbocker Club at 62d street and Fifth avenue; the new Colony Club at Park avenue and 60th street; the new building for the Princeton Club is to go at 58th street and Park avenue, and the new Theatrical Club, "The Friars," is about half-way between the theater and the Fifth avenue district, in 48th street, near Sixth avenue. It is a rather interesting thing that three of these clubs — the Colony Club, the Knickerbocker Club, and the Calumet Club — should have been executed in substantially the same style of architecture, a modification of Georgian, and they are perhaps as interesting pieces of design as anything we have had in the city for some time. The Friars' Club has chosen a style more or less appropriate to its name and has a most interesting pseudo-Gothic façade, but one which is nevertheless distinctly "clubby." The use of Gothic has been extended, as was said in the last article, to a number of the loft buildings in New York, and they show how great a variance is possible with good design in the same style.

The building for the Hampton shops is of all those in the Gothic style the most interesting and in many respects the most consistent; it is a very lovely piece of design in the Gothic manner, with a full realization of



View Looking Down 43d Street to Grand Central Terminal

the requirements of the modern office building and of modern construction. It is also pleasant to see that the architects of this building did not stop the design with the street façade, but designed a side wall which is agreeable in itself, of balanced character, and even including the water tanks is a very pleasant object.

The newest of the tall office buildings — and designed to house the newest of our industries — is the Film Building at Broadway and 49th street. This is an extraordinary piece of architecture and in many respects a very satisfactory one, with decorative motives which have been lifted more or less bodily from medieval Italian

View Looking North Along Park Avenue from 53d Street

Hayden Building, Park Avenue and 57th Street
Louis Allen Abramson and Lawrence Barrand, Associate Architects

work. For the main cornice the architects have substituted the machicolated balcony, similar to those on some of the Italian town halls, and curiously enough the motive which fits the tall, slender type does not appear at all misplaced as the crowning motive for this tall, box shaped structure. The details of the lower stories are of extreme interest, especially in the handling of the brickwork and in the treatment of the ironwork around the windows and the plate glass above. It may be possible that the novelty of the building is what attracts me to it, and yet I cannot help feeling that the architects have produced something of great originality and structural merit.

Aside from this building, the Broadway district has little of very great interest to offer, and it seems regrettable that so many amusement structures should have been erected with so little architectural merit. Yet there is probably no other sort of building where fertility of invention and play of judicious fancy is afforded so great an opportunity. This we saw at Dreamland, Coney Island, some years ago, when the amusement park built out of lath and plaster displayed architectural quality surpassing most exhibition work.

Unfortunately about the only building in the theater district which has any real quality of modernity and gayety is the little Punch and Judy Theatre, where the façade is of the simplest possible description, relieved by a couple of color decorations and some decorative lines. The conception is one new to the theater and most appropriate not only to theatrical work in general, but to this particular house. Of another type is the Cort Theatre, one of the best designed of the newer buildings and to which little exception can be taken. Of excellent material, good in detail, obviously fitting its purpose, the only thing which can be said against it is that it lacks theatrical instinct. I have often wished that architects could design some of the stage sets in which architecture is used; now I am inclined to think that some of our scenic artists could design theater façades which would be more interesting and more appropriate, possibly even more beautiful, than our architects have been doing. This is, of course, in part due to the fact that theater designing has been mainly in the hands of a very few men who have made a specialty of it, and they have been selected for new work in this line because of their knowledge of the practical requirements without regard to their æsthetic qualifications. I do not, of course, mean to say that all theater designers are incompetent architects, but certainly there are very many men who could design better façades than most theater architects have produced. The theater competitions in THE BRICKBVILDER alone are evidence enough on this point.

The residences between 42d street and 59th street are few and far between, and with the exception of the apartment houses before spoken of along

Friars Club, West 48th St.
Harry Allan Jacobs, Architect

Knickerbocker Club, Fifth Avenue and East 62d Street
Delano & Aldrich, Architects

Black, Starr & Frost Building
Fifth Avenue
Carrere & Hastings, Architects

Colony Club, Park Avenue and
60th Street
Delano & Aldrich, Architects

Dreicer Building, Fifth Avenue
and 46th Street
Warren & Wetmore, Architects

Park avenue, show little that needs special comment. There have been built, however, on the side streets between Fifth and Sixth avenues, a few apartments in which the modern variation of Adam architecture has been employed with excellent effect. The illustrations of apartments herewith are of good clean cut design, and while perhaps no better than a number of others recently constructed, are at least up to the highest current standard. There are many apartment houses of this type being erected in New York, and the examples illustrated show what can be done with a rather difficult problem and with a very sparing use of expensive materials.

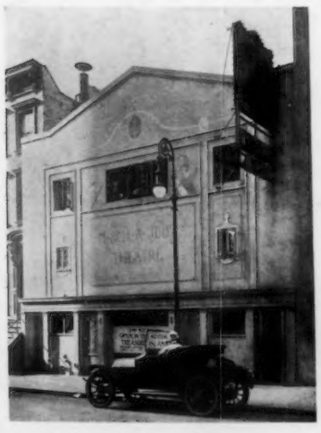
The other "residences" within this district are mainly hotels, of which the Ritz-Carlton is an excellent example, and bachelor apartments or studio apartments above the shops in 25-foot buildings. I cannot refrain from again illustrating the lower portion of the Ritz-Carlton simply because of the exquisite proportions of the base and order, which have served for a model for so many of the large hotels built in the last five years.

Film Building, 49th Street and Seventh Avenue
H. L. Meader, Architect

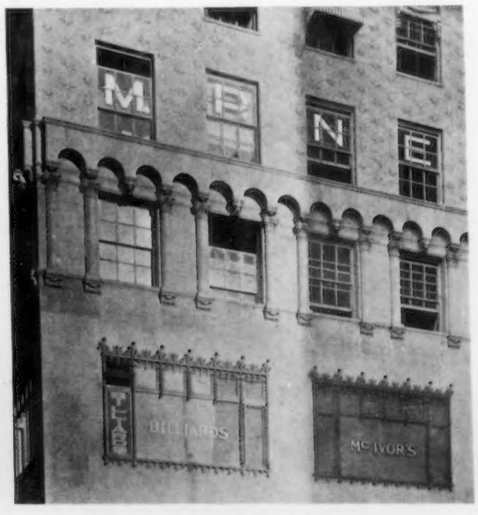
After all, the chief interest within this district, both architecturally and to the visitor to New York, is the small shop, and in this respect New York is perhaps unique. I have yet to find in any of our other large American cities the smart, small shop developed to a like degree, and certainly nowhere is there such an assemblage of small shop buildings of such excellent quality. It is true that no single style of architecture has been employed for them, but the very diversity of motives which have been used is a commensurate gain in their interest to the architectural designer, although these motives seem to have been chosen not because of their particular fitness to the goods displayed in the shop, but mainly for their novelty and intrinsic merit.

The shop for the Edison Company has been several times illustrated, and it is regrettable that no illustration can do justice to the richness of color in the terra-cotta work filling the window openings and decorating the cornice, which latter, by the way, is ugly in an illustration and lovely in reality. Alexander's shoe shop has a similar cornice treatment, not perhaps so good, but the balance of the building, magnificently enriched with sgraffito as beautiful in execution as it is in design, leads one to admire it more than any other on the avenue.

Joseph's, at 632 Fifth avenue, is of widely different type, ultra modern in its tendencies and very excellently done, although somewhat hard and wire drawn. Dreicer's jewelry shop looks the part; the base is of black and gold marble with gilded caps; the upper stories are of limestone, and the building as a whole is quite as agreeable as the more elaborate, and perhaps more carefully designed building of Black, Starr & Frost. In 48th street a number of these small store



Punch & Judy Theatre
Murphy & Dana, Architects



Detail of Lower Stories of Film Building
H. L. Meader, Architect

Cort Theatre
Thomas W. Lamb, Architect

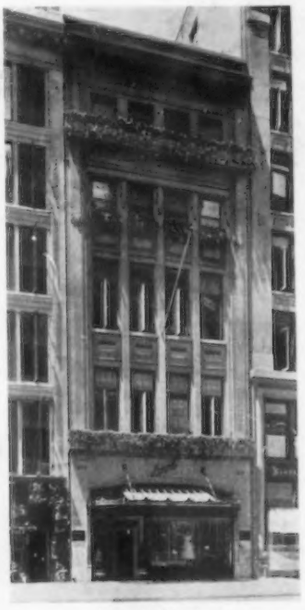
buildings, running from five to six stories in height, are placed in juxtaposition, and while one cannot admire the combination of German *art nouveau* and quiet Italian art in two neighboring buildings, each is clever in its way, and the Italian one is beautifully detailed.

In striking contrast to the careless disregard of neighboring structures is the treatment of the block on Fifth avenue between 52d and 53d streets. On the northwest corner of 53d street is St. Thomas' Church, familiar to all architects as one of the best examples of modern Gothic in this country. On the northwest corner of 52d street is the wonderful early Renaissance Vanderbilt house, designed by the late R. M. Hunt. Next to the Vanderbilt house is another residence of substantially similar character, and when Hofstatter and Revillon built the two buildings, which together occupy the southwest corner of 53d street and Fifth avenue, they very appropriately caused their structures to be designed in a style generally conforming to the Vanderbilt house on the one hand and the church on the other. While the buildings in themselves are perhaps not as excellent as, let us say, the Alexander Building, they are nevertheless far more appropriate to this position than buildings of any other type would have been, and show a commendable deference to architectural order almost without precedent in New York.

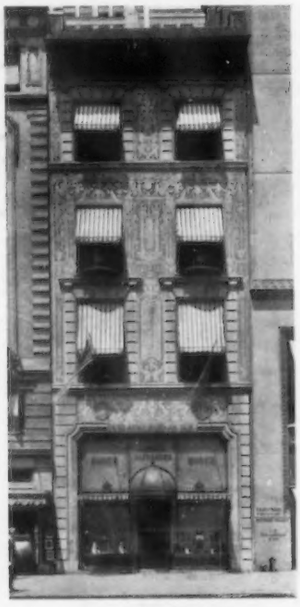
Hofstatter and Revillon Freres Buildings
Henry Otis Chapman, Architect

It will be seen from the illustrations what an enormous growth and change have taken place from 23d street up, within the past few years, and regrettable as has been the monetary loss caused by the process, we cannot but feel that if the change is to be permanent, it has been worth while.

But who knows? Perhaps the next article I am called upon to write will be "From 59th street Up."



Joseph Building
Henry Otis Chapman, Architect



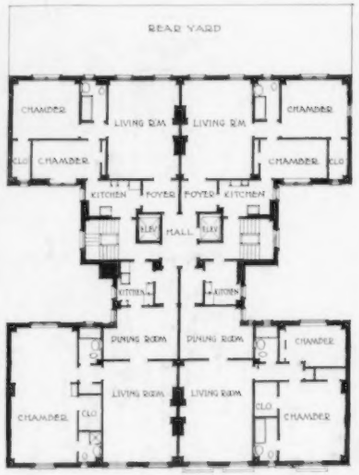
Alexander Building
Carrere & Hastings, Architects

Ruszits Building
7 East 48th Street
McKim, Mead & White, Architects

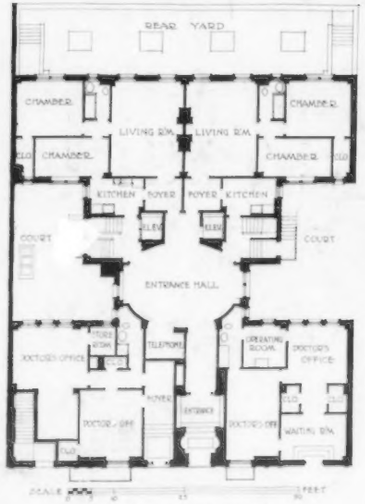
Detail of Lower Stories of Ritz-Carlton Hotel
47th Street and Madison Avenue
Warren & Wetmore, Architects

Frank Bros. Building
588 Fifth Avenue
Alfred Freeman, Architect

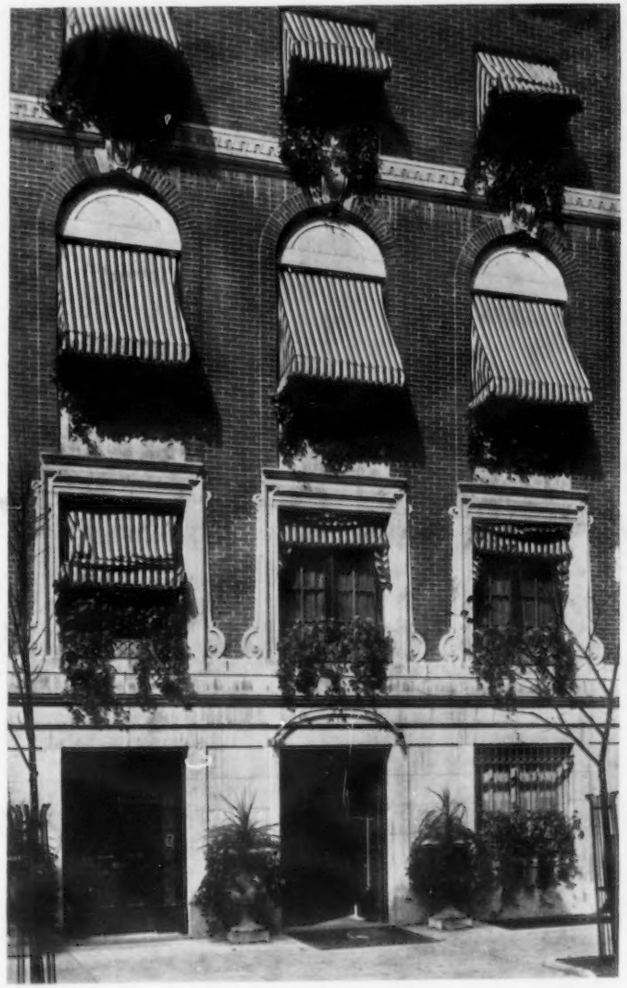
GENERAL VIEW OF EXTERIOR



TYPICAL FLOOR PLAN



GROUND FLOOR PLAN



DETAIL OF LOWER STORIES

APARTMENT HOUSE, 15 WEST 55TH STREET, NEW YORK, N. Y.
WALLIS & GOODWILLIE, ARCHITECTS

GENERAL VIEW

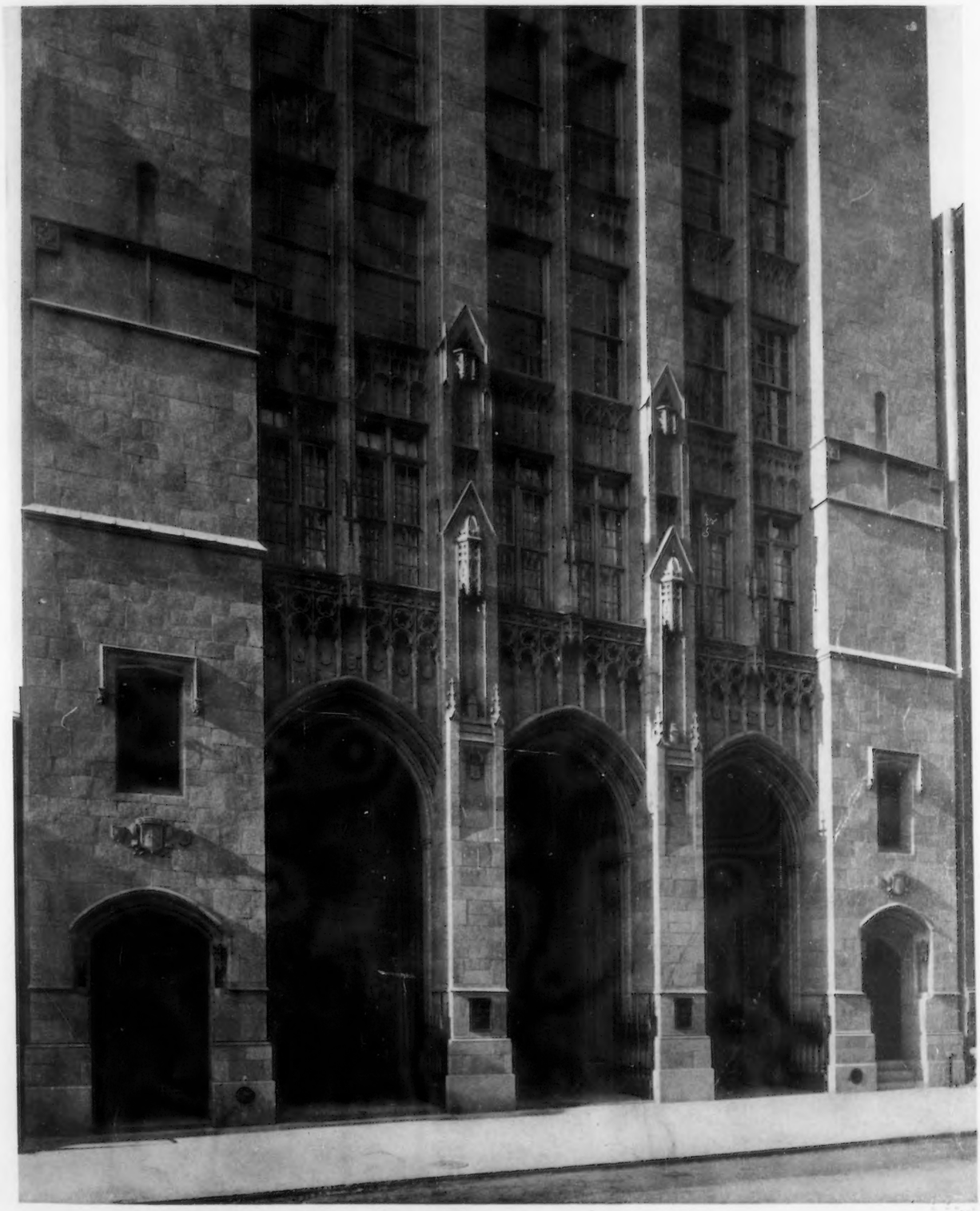
TYPICAL FLOOR PLAN

FIRST FLOOR PLAN

DETAIL OF ENTRANCE

APARTMENT HOUSE, EAST 62D STREET, NEW YORK, N. Y.

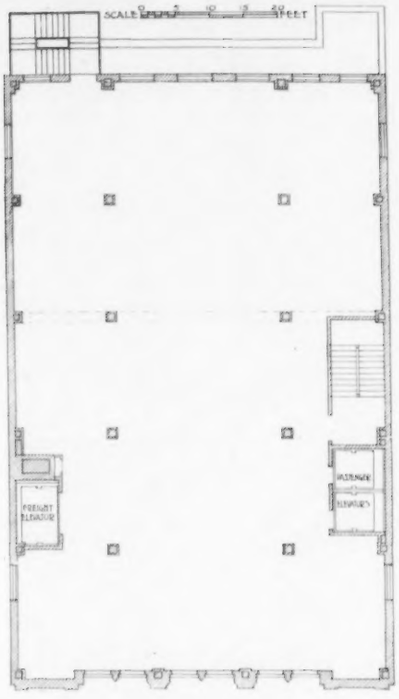
W. L. ROUSE & L. A. GOLDSTONE, ARCHITECTS



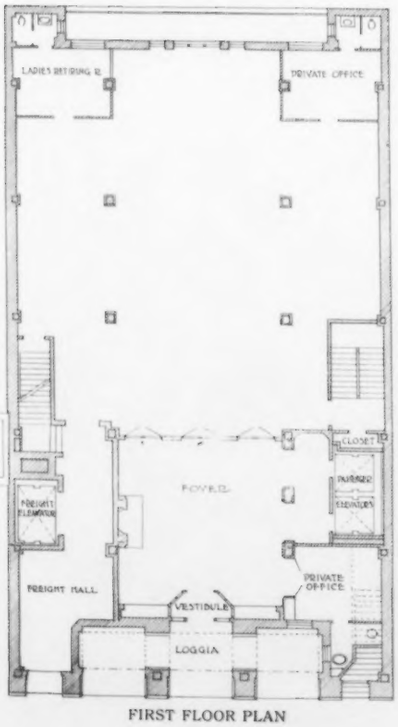
DETAIL OF LOWER STORIES

HAMPTON SHOPS BUILDING, EAST 50TH STREET, NEW YORK, N. Y.

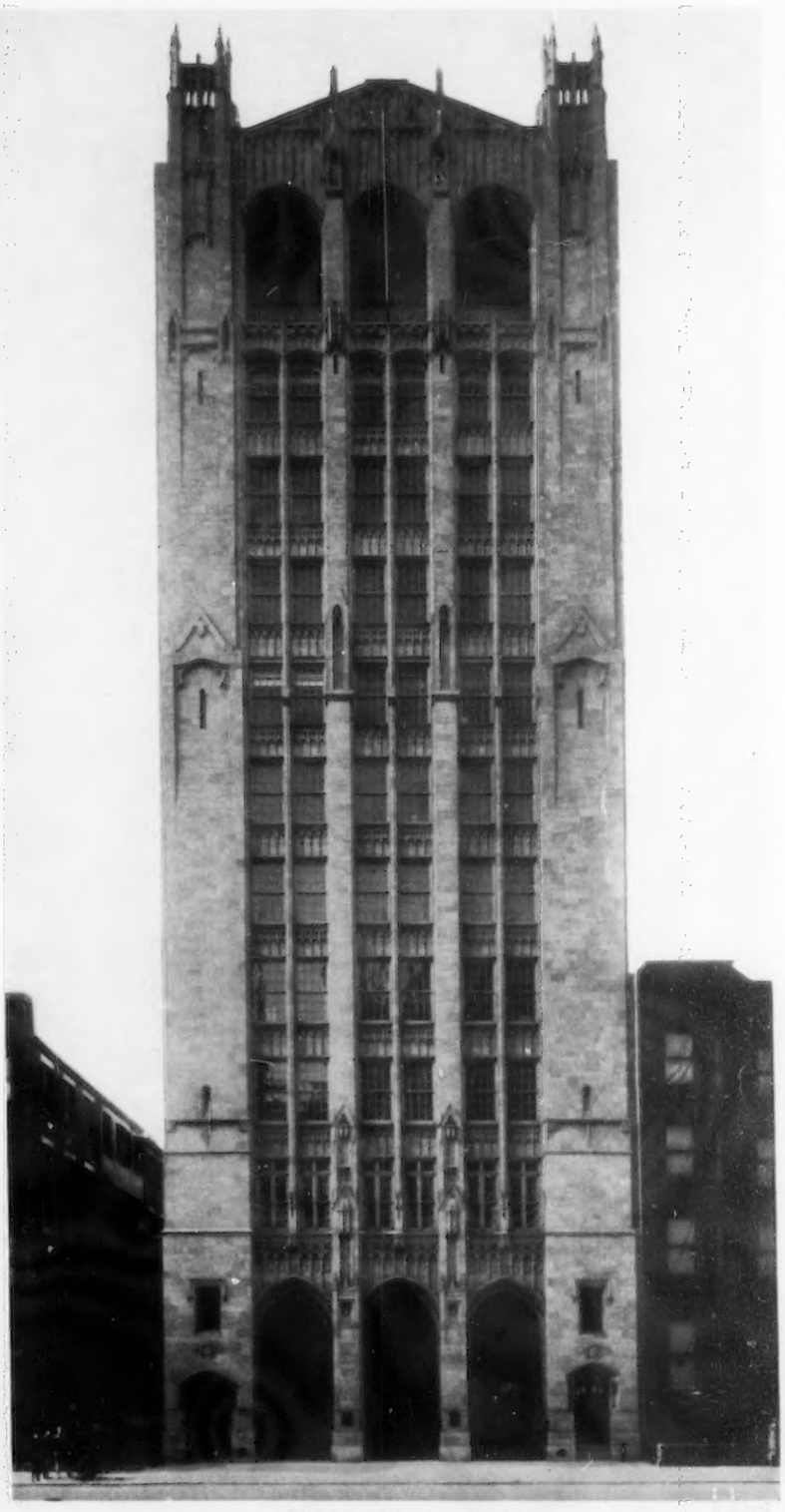
W. L. ROUSE & L. A. GOLDSTONE & JOSEPH L. STEINAM, ARCHITECTS



TYPICAL FLOOR PLAN



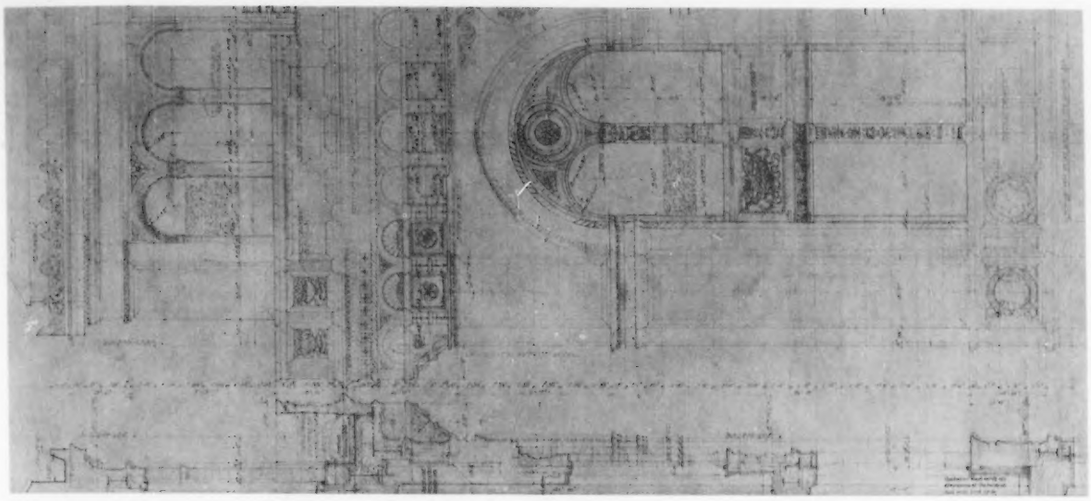
FIRST FLOOR PLAN



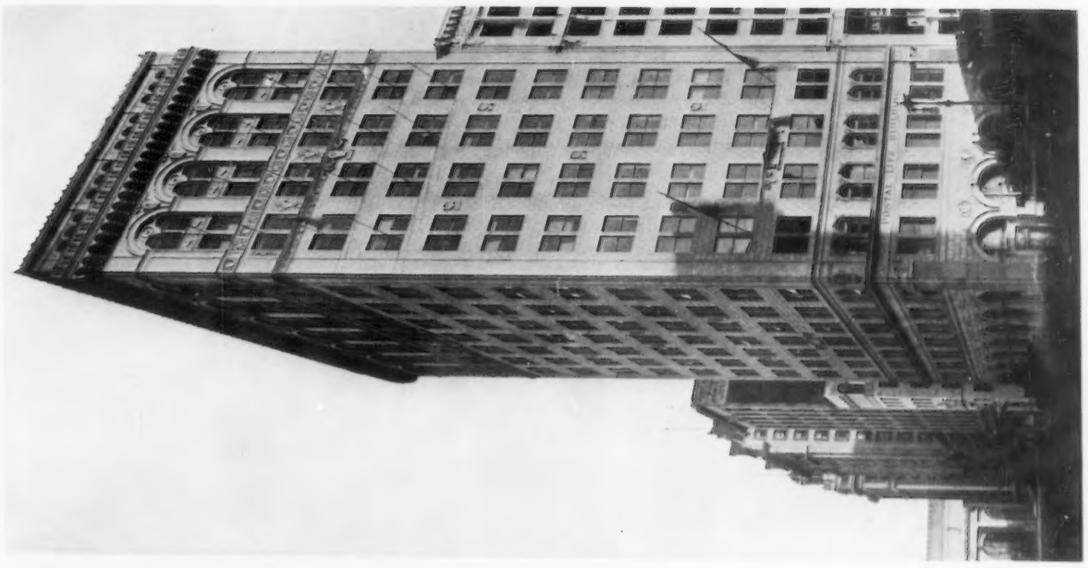
GENERAL VIEW OF ELEVATION

HAMPTON SHOPS BUILDING, EAST 50TH STREET, NEW YORK, N. Y.

W. L. ROUSE & L. A. GOLDSTONE & JOSEPH L. STEINMAN, ARCHITECTS

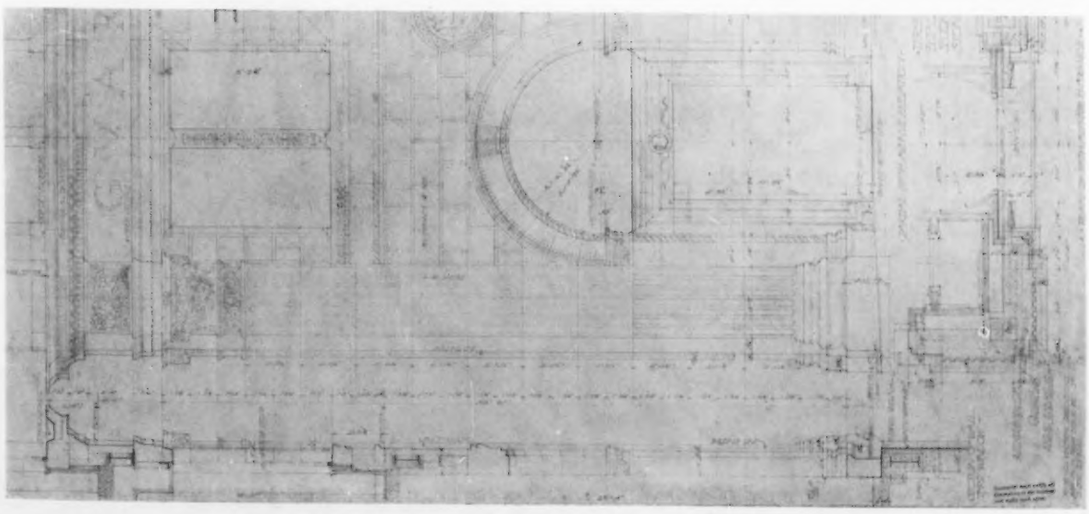


DETAIL OF UPPER STORIES
Reproduced at ¼-inch scale



GENERAL VIEW OF EXTERIOR

POSTAL LIFE BUILDING, 43D STREET AND FIFTH AVENUE, NEW YORK, N. Y.
YORK & SAWYER, ARCHITECTS



DETAIL OF LOWER STORIES
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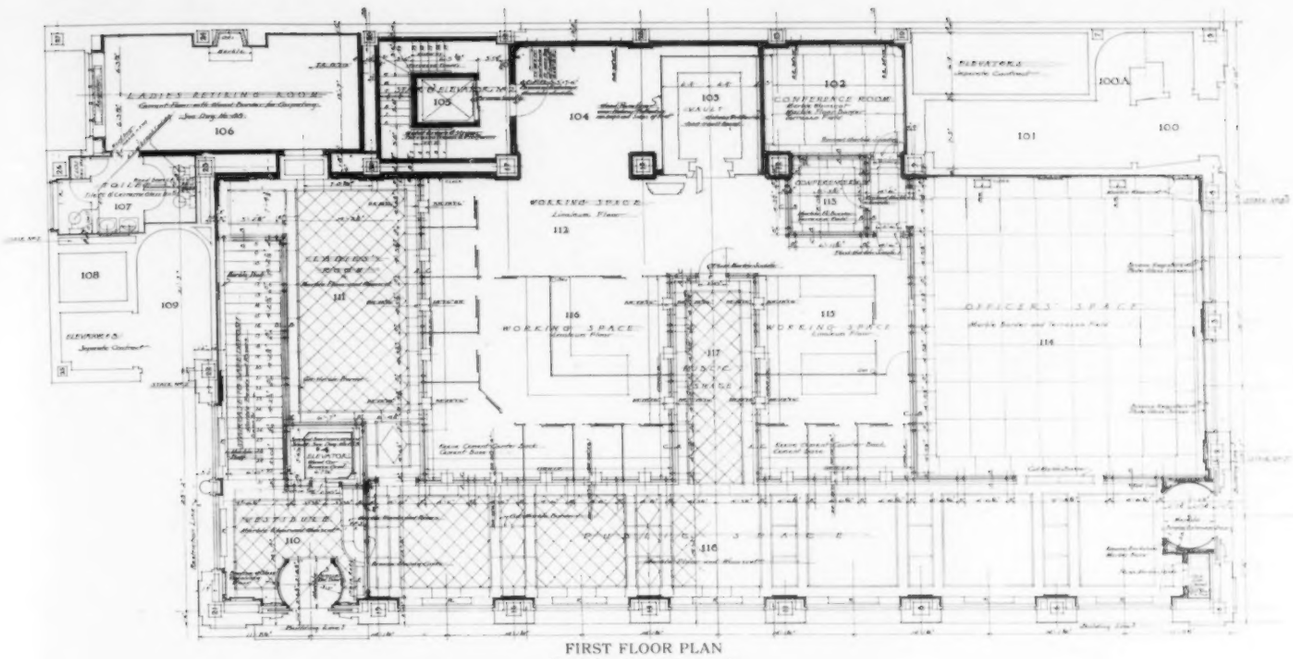
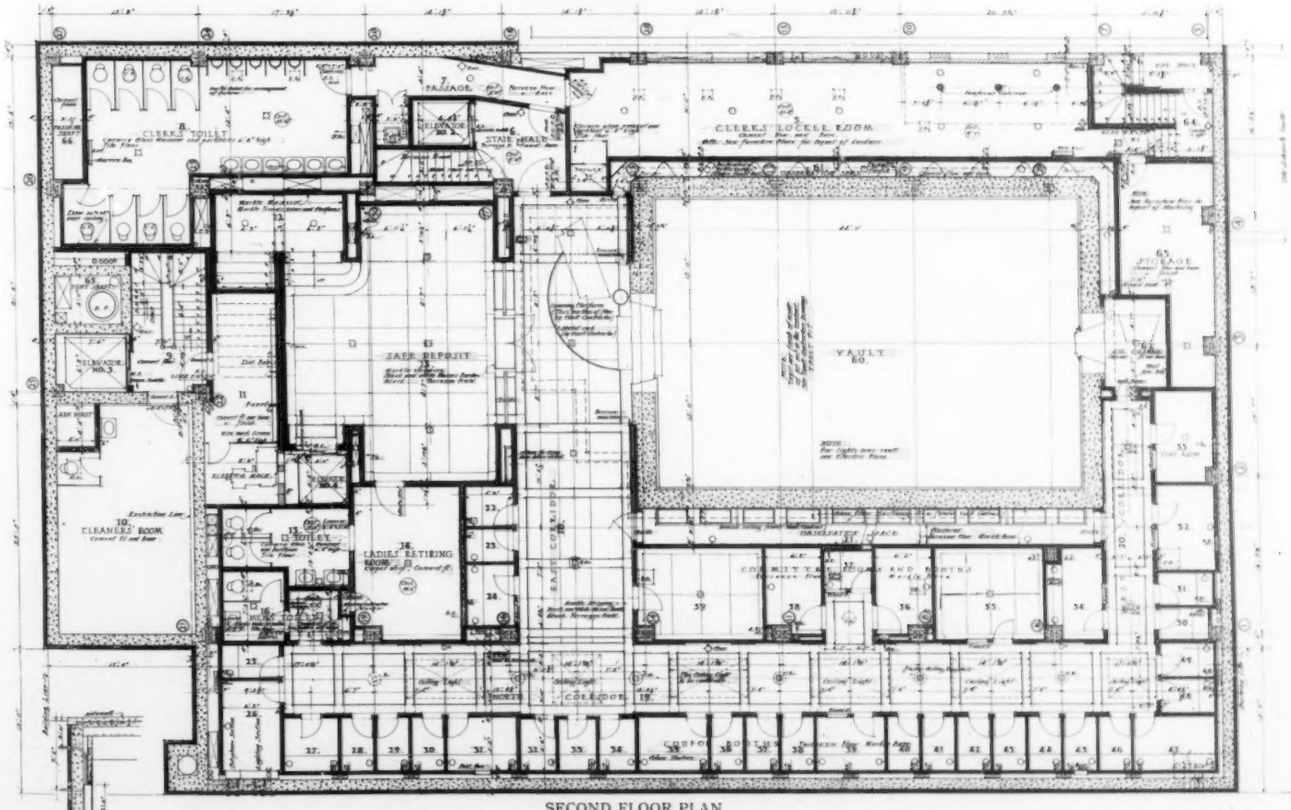


FIRST FLOOR PLAN
Reproduced at 3/16-inch scale



SECOND FLOOR PLAN
Reproduced at 3/16-inch scale

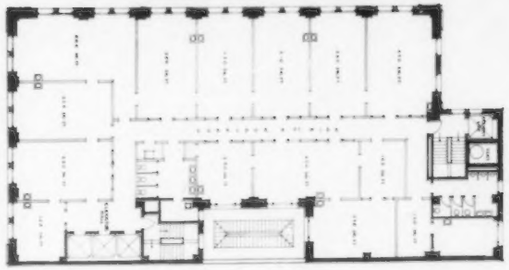
The above plans show the arrangement of the floors occupied by the Fifth Avenue Branch of the Guaranty Trust Company and the Guaranty Safe Deposit Company

POSTAL LIFE BUILDING, 43D STREET AND FIFTH AVENUE, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS

DETAIL OF UPPER STORIES

ENTRANCE TO BANKING ROOMS

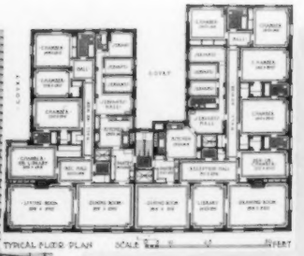


TYPICAL OFFICE FLOOR PLAN

POSTAL LIFE BUILDING, 43D STREET AND FIFTH AVENUE, NEW YORK, N. Y.

YORK & SAWYER, ARCHITECTS

DETAIL OF MAIN ENTRANCE



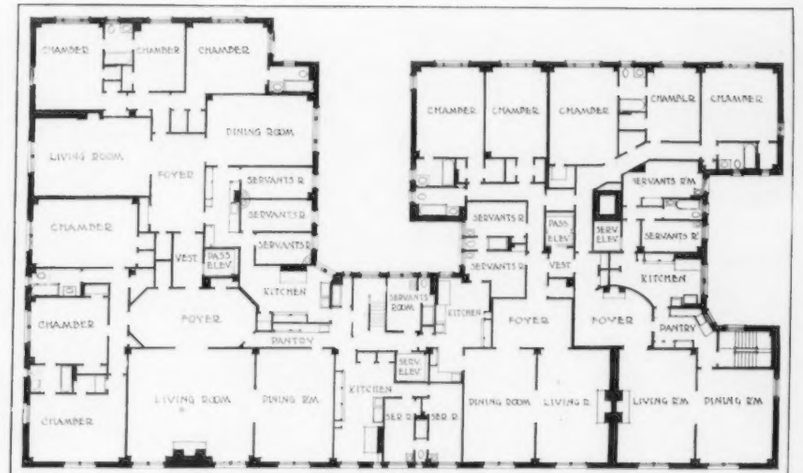
TYPICAL FLOOR PLAN

GENERAL VIEW OF EXTERIOR

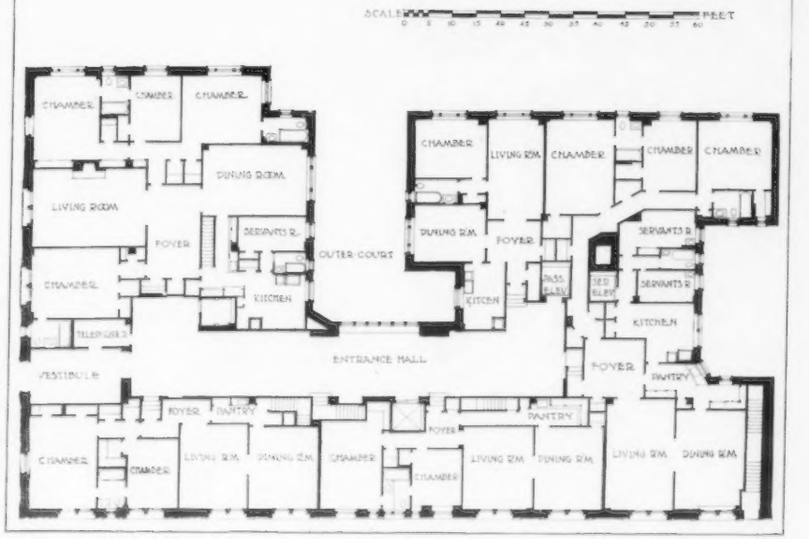
APARTMENT HOUSE, 960 PARK AVENUE, NEW YORK, N. Y.

D. EVERETT WAID AND J. E. R. CARPENTER, ASSOCIATED ARCHITECTS

GENERAL VIEW OF EXTERIOR



TYPICAL FLOOR PLAN



FIRST FLOOR PLAN

APARTMENT HOUSE, 850 PARK AVENUE, NEW YORK, N. Y.

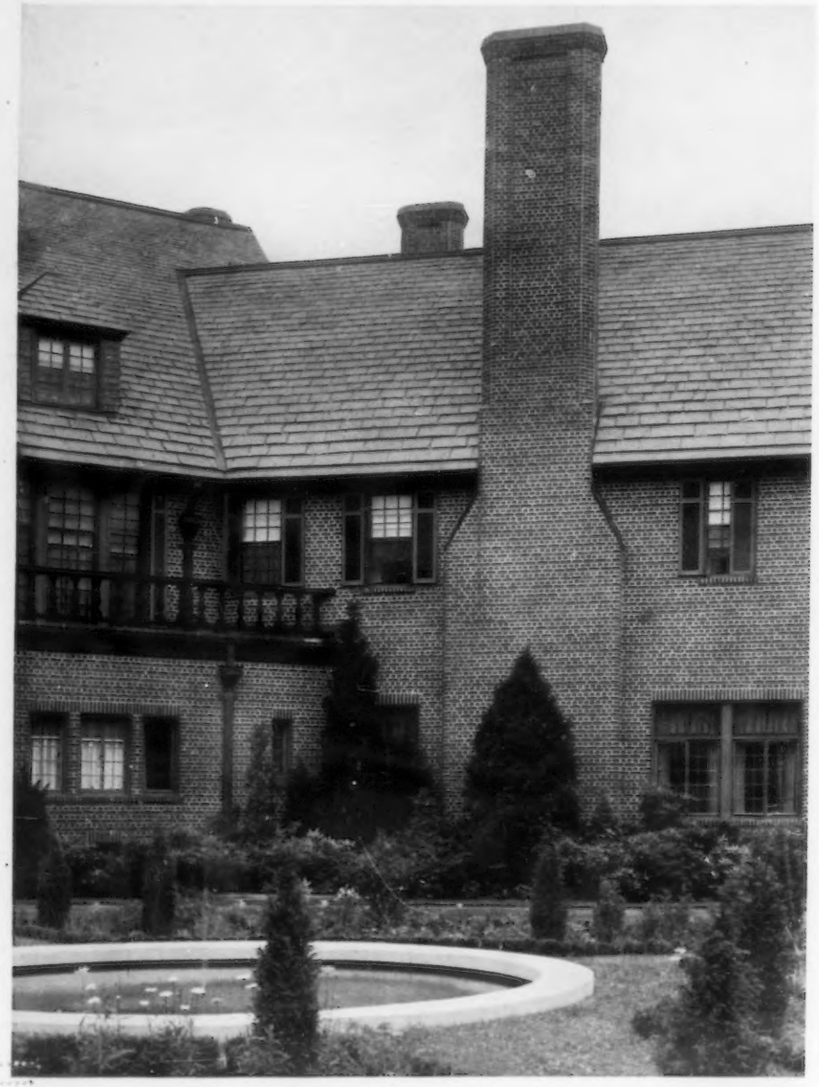
W. L. ROUSE & L. A. GOLDSTONE, ARCHITECTS

VIEW OF ENTRANCE FRONT FROM DRIVEWAY

VIEW OF GARDEN FRONT

HOUSE OF HON. W. J. TULLY, LOCUST VALLEY, LONG ISLAND, N. Y.

KENNETH M. MURCHISON, ARCHITECT



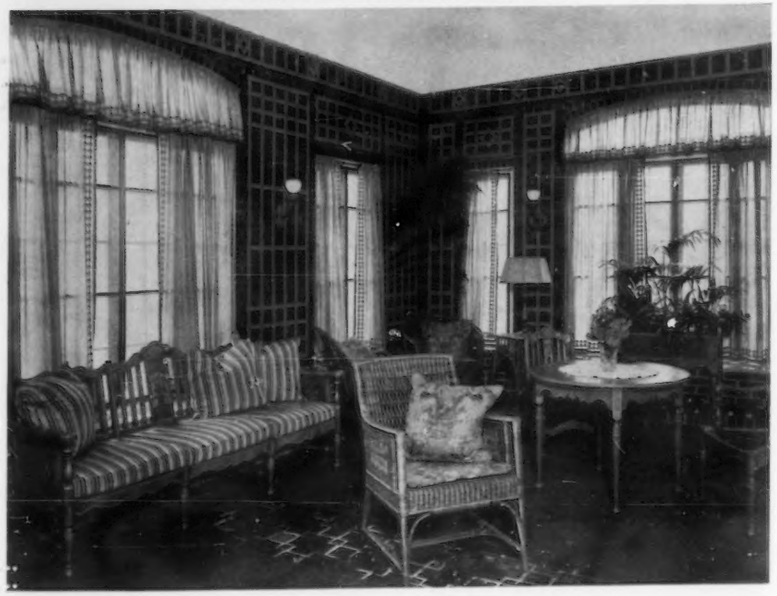
DETAIL OF HOUSE FROM FORECOURT

DETAIL OF SERVICE END GABLE

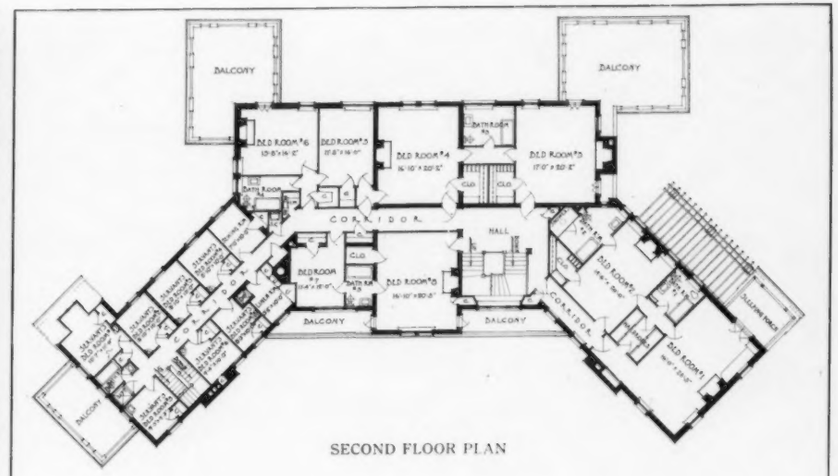
HOUSE OF HON. W. J. TULLY, LOCUST VALLEY, LONG ISLAND, N. Y.

KENNETH M. MURCHISON, ARCHITECT

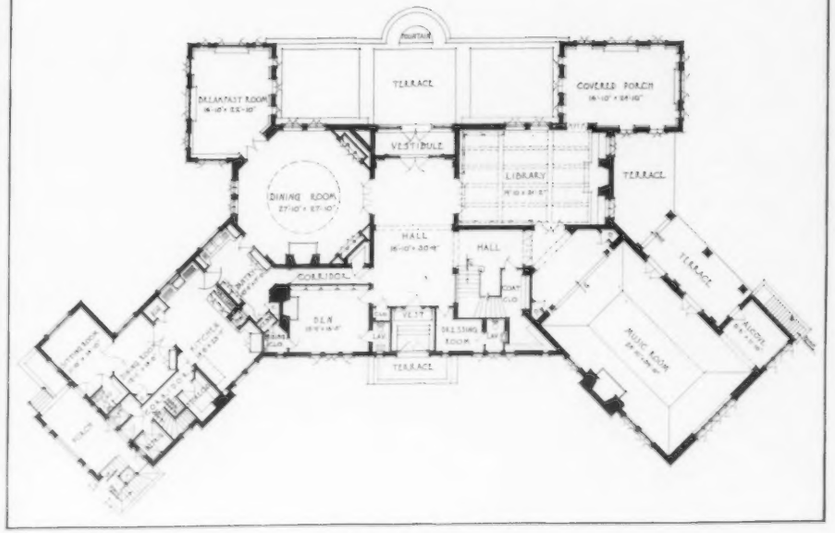
VIEW IN HALL LOOKING TOWARD VESTIBULE



INTERIOR OF ENCLOSED PORCH



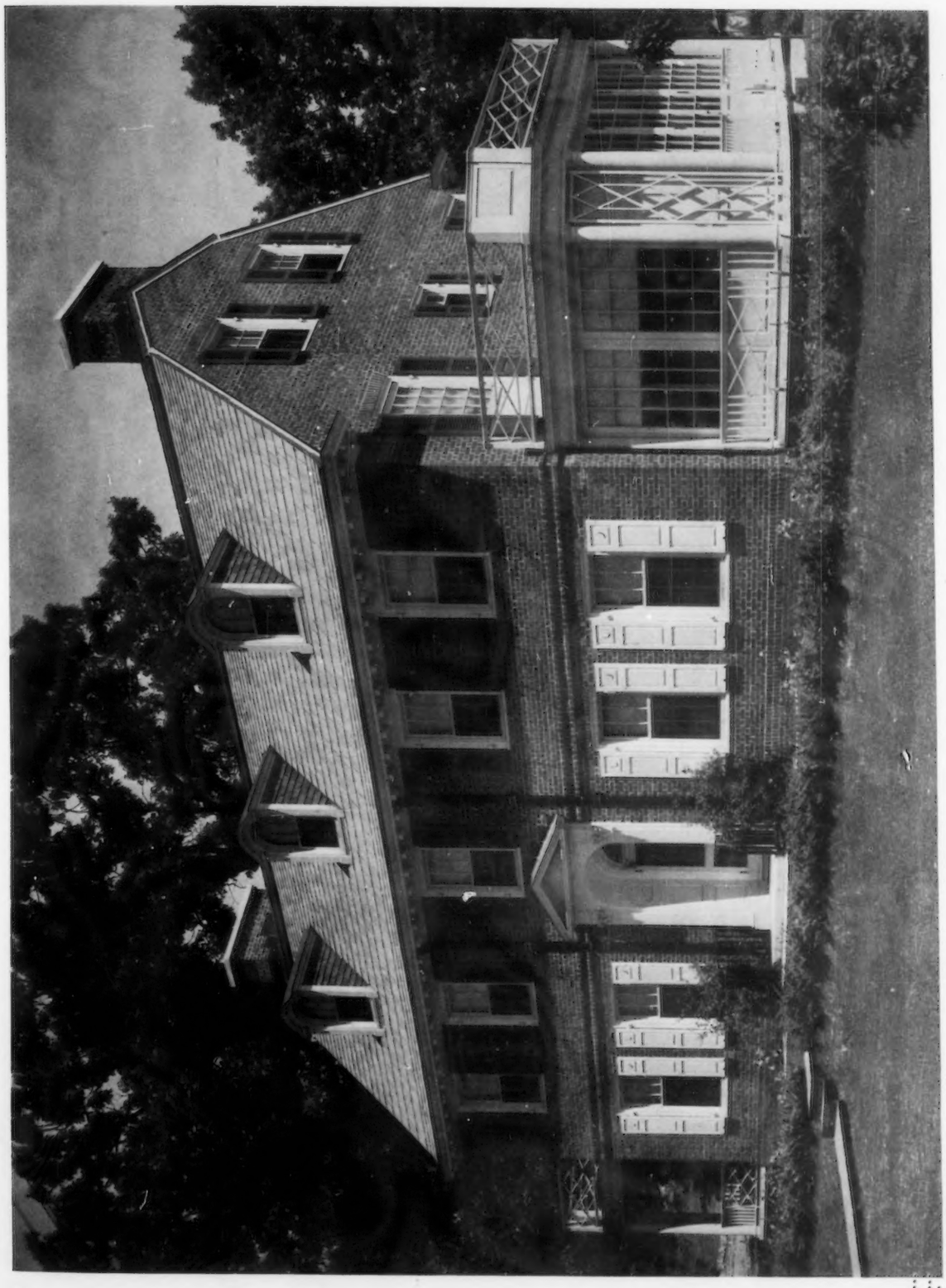
SECOND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE OF HON. W. J. TULLY, LOCUST VALLEY, LONG ISLAND, N. Y.

KENNETH M. MURCHISON, ARCHITECT



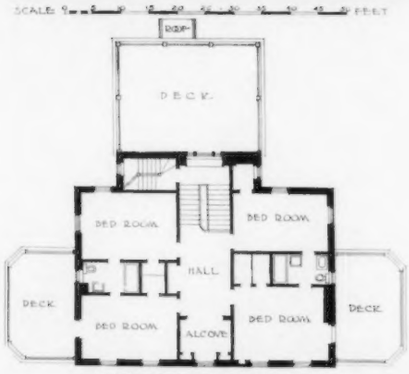
HOUSE OF TOWNSEND G. TREADWAY, ESQ., BRISTOL, CONN.
MURPHY & DANA, ARCHITECTS

DETAIL OF DOORWAY

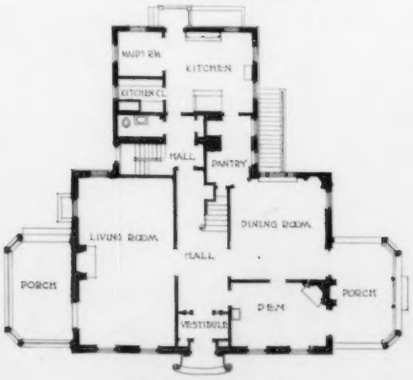
HOUSE OF TOWNSEND G. TREADWAY, ESQ., BRISTOL, CONN.

MURPHY & DANA, ARCHITECTS

DINING ROOM



SECOND FLOOR PLAN



FIRST FLOOR PLAN

HALL AND STAIRWAY

HOUSE OF TOWNSEND G. TREADWAY, ESQ., BRISTOL, CONN.

MURPHY & DANA, ARCHITECTS

DETAIL OF FRONT ELEVATION

HOUSE OF WILLIAM H. DAVIDGE, ESQ., WESTON, CONN.

MURPHY & DANA, ARCHITECTS

VIEW OF ENTRANCE FRONT

VIEW OF SIDE AND REAR

HOUSE OF WILLIAM H. DAVIDGE, ESQ., WESTON, CONN.

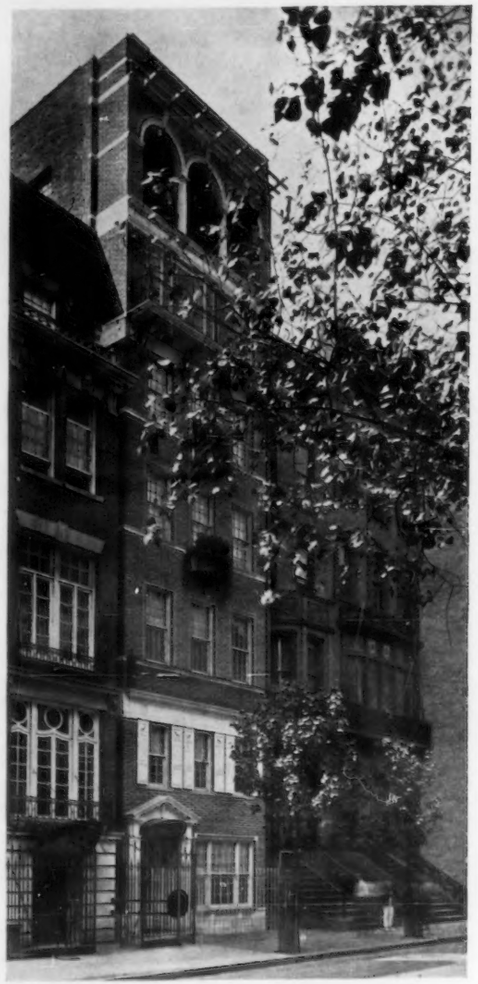
MURPHY & DANA, ARCHITECTS

LIVING ROOM

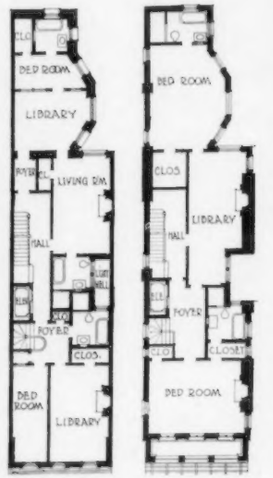
DINING ROOM

HOUSE OF WILLIAM H. DAVIDGE, ESQ., WESTON, CONN.

MURPHY & DANA, ARCHITECTS



GENERAL VIEW



THIRD FLOOR SEVENTH FLOOR

FIRST FLOOR SECOND FLOOR

DETAIL OF ENTRANCE

KNICKERBOCKER CHAMBERS, EAST 62D STREET, NEW YORK, N. Y.
SAMUEL R. T. VERY, ARCHITECT

APARTMENT HOUSE, 930 PARK AVENUE
NEW YORK, N. Y.

SCHWARTZ & GROSS, ARCHITECTS

TYPICAL FLOOR PLAN

FIRST FLOOR PLAN

TYPICAL FLOOR PLAN

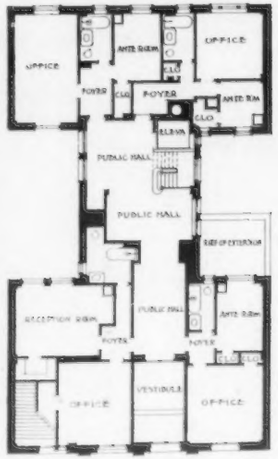
Two upper illustrations show plans of apartment house at right. Lower illustration shows typical plan of apartment house at left

APARTMENT HOUSE, 79TH STREET AND PARK AVENUE
NEW YORK, N. Y.

ROBERT T. LYONS, ARCHITECT

GENERAL VIEW

TYPICAL FLOOR PLAN



FIRST FLOOR PLAN

DETAIL OF LOWER STORIES

APARTMENT HOUSE, WEST 55TH STREET, NEW YORK, N. Y.

SOMMERFELD & STECKLER, ARCHITECTS

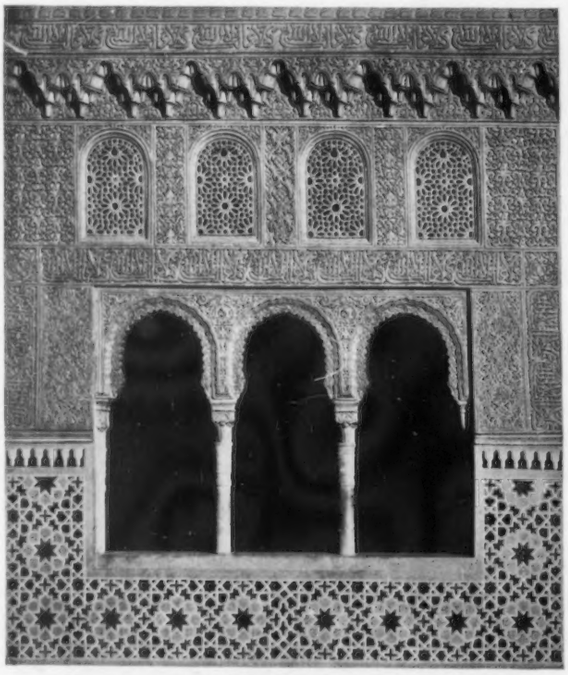
Decorative Plaster Work

PART II. THE WORK OF THE RENAISSANCE PERIOD

By A. D. F. HAMLIN

Professor of the History of Architecture, Columbia University

WITH the fall of Rome in the fifth century A.D. the art of the decorative plasterer seems to have sunk into a long eclipse. Throughout the Middle Ages, for over a thousand years, plaster was used only as a covering for rough masonry or a surface upon which to apply decoration in color either by painting or in mosaic. The possibilities of gypsum as a material for plastic decoration were unknown or ignored. The Roman ruins were despised and demolished, the substructions of the Golden House of Nero under the ruins of the Baths of Titus were abandoned to the bats or to the robbers who infested the once proud capital of the world. The soil above buried Pompeii had not been disturbed; her very existence was forgotten. The Early Christian, Byzantine, Romanesque, and Gothic styles of architecture which successively covered the lands of Christian Europe with splendid churches, baptisteries, and cathedrals employed other forms of decoration than that of plaster-relief: fresco, mosaic, marble-incrustation, carving, and stained glass. Only in the Mohammedan world did plaster work find favor, especially in Persia. There the abundance of clay and the general use of brick for building brought about the development of an external decoration of encaustic tiles and an interior decoration in part by tiles and in part — especially in the ceilings — by plaster. The late R. Phené Spiers of London — whose recent death has removed one of the most versatile and brilliant of English scholar-architects — has pointed out the important part played by the Persian workers in brick and plaster in the development of Moslem "stalactite" work. This curious and almost bewildering form of decoration by geometric units spread as early as the thirteenth century throughout the Moslem world from Persia to Spain and even to India eastward, to be executed often in carved marble, as well as in plaster.



Plaster Decoration, Hall of Two Sisters in the Alhambra, Granada, Spain

It was in Spain, indeed, that the most striking use of stucco for decoration was evolved. The Moors of Spain developed this use — derived from that which prevailed in North Africa — into the splendid and showy adornments of the Alhambra and Generalife at Granada, the Alcazar of Seville, and the later parts of the "Mosque" at Cordova and the "House of Pilate" at Seville. In these buildings the spandrels and wall spaces were covered with the most intricate diaper-work in plaster of Paris or hard stucco, the pattern being brought out by the use of brilliant color and gilding. Whether these patterns were cast in separate pieces which were later set in place, or were stamped upon and into the wet plaster on the wall, I do not know. Probably both methods were employed as occasion demanded.

It was not until the sixteenth century that *stucco duro* or hard moulded plaster came into use for artistic decoration in the Christian world, and it was in Italy that the long-forgotten art was rediscovered and revived. Throughout the fifteenth century it had been the custom of the Italian sculptors to make replicas of their works in various plastic compositions, and to color them while the composition was still wet. Thus Donatello is said to have mixed lime, pounded brick and glue, in which composition he modeled a number of works. Plaster as a material on which to execute mural paintings in fresco had long been in use; the glorious school of Giotto and the Giotteschi had created a new art by its use, and their work had ushered in the whole Renaissance movement in painting. But the two elements — plastic modeling and decorative painting on plaster — had never yet been brought together. For their marriage the labors of many hands and minds were necessary.

In 1488 or thereabout the Cardinal Giovanni dei Medici of Florence, son of Lorenzo the Magnificent, and a connoisseur and collector of antique art, employed a certain Luzzo or Morto da Feltro to make excavations and researches among the ruins of Rome. In the course of these researches Luzzo explored the ill reputed "Grottoes" under the ruins of the Baths of Titus, and was fascinated by the beauty of the painted decorations on the piers and vaults which formed the substructions in part of

Plaster Decoration of the "Loggie," Vatican, Rome

the Golden House of Nero and in part of the Baths of Titus. To him Vasari gives the credit of the revival of the art of painting "arabesques and grotesques," based upon the light and fanciful decorations of these "Grottoes." A pupil or relative, Andrea di Cosimo dei Feltrini, is claimed by Vasari as the inventor of "sgraffito" decoration. As this is not painting, but a manipulation of the plaster itself, it deserves a few words of explanation. Upon the first rough coat of the exterior wall the plasterer spreads a coat of *intonaco*, a brown lime plaster colored by an admixture of charcoal or straw ashes. When this has hardened, a thin coat of fine white stucco or lime plaster with an admixture of plaster of Paris or marble dust or both is applied, and the decorative pattern etched through it with a stylus or graving iron. Sgraffito is practised to this day in Italy, especially in Florence and Rome. It is capable of very fine effects, and there is no reason why, in regions where frost and dampness do not prevail, it should not be introduced into our American practice.

Some twenty years after the discovery of the Grottoes by Morto da Feltro, Raphael was called to Rome by the Pope, Julius II, upon the advice of the architect Bramante and commissioned to decorate certain parts of the Vatican. Here the young painter, twenty-five years of age, came under the influence of the antique and was fascinated by the remains of Roman decorative art. With his assistant, Giovanni da Udine, he visited the now famous Grottoes again and again, and absorbed to a marvelous degree the spirit and character of their decorations. He resolved to apply his new-found knowledge in the decoration of one story of the arcades of the Court of San Damaso, built by Bramante, and Giovanni was directed to fathom the secret of the *stucco duro* in order to combine low relief with color, as the Romans had done. It is, then, to Giovanni da Udine that we owe the revival of the old Roman technic of stucco relief, as it is to Raphael and da Feltro together that the revival of the Roman conception of "arabesque" design — that is, the fanciful mixture of natural and conventional forms in graceful and flowing decorations — is due. The "Loggie" of the Vatican, as the arcades of San Damaso are called, with all their faults of scale — the faults of a pioneer overflowing with enthusiasm — are a monument of creative design, exquisitely beautiful after more than four centuries, never surpassed even by masters more thoroughly trained in architecture than the young Raphael.

The design of the never completed Villa Madama is ascribed to Raphael. Certain it is that the noble entrance hall, with its vaulted ceiling and three recesses, was decorated by Raphael's assistant, Giovanni da Udine, and his most noted pupil, Giulio Romano. These decorations are among the most prized monuments of the Cinquecento, and casts from them are to be found in many of the world's museums. There is more architectural vigor and more variety in these decorations than in the Vatican Loggie; perhaps less of the peculiar delicacy that invests all of Raphael's own work.

Giulio Romano carried his art to Mantua, where the Palazzo del Té was decorated and partly reconstructed from his designs. From this time on the vogue of stucco as a material for interior decoration increased rapidly throughout Italy. Apparently there must have been toward the middle of the sixteenth century a greatly in-

Plaster Decoration in Francis I Gallery, Fontainebleau Palace, France

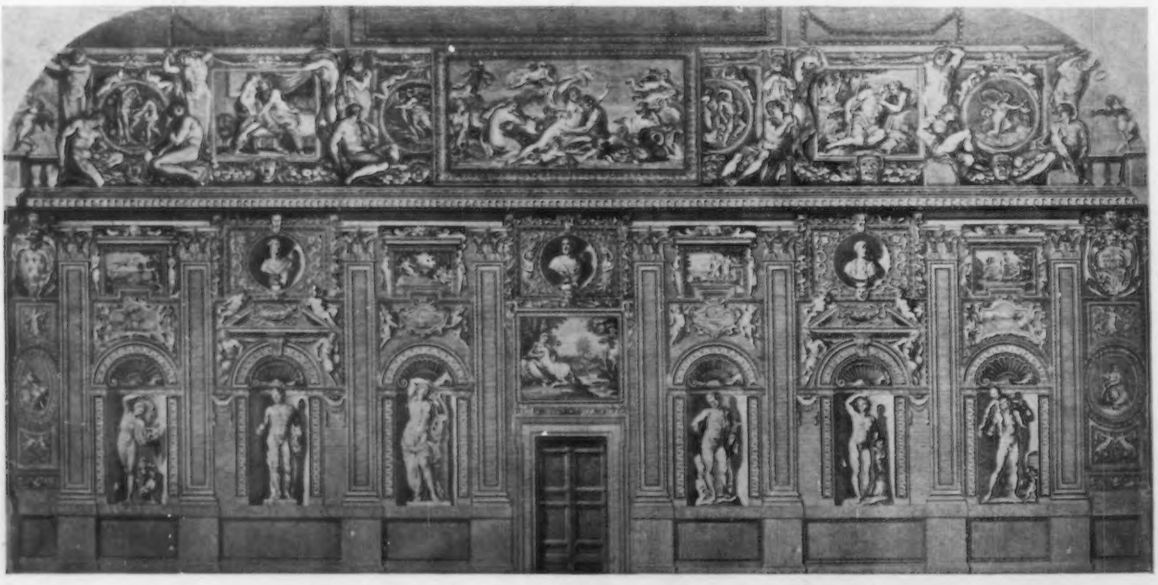
creased working of deposits of gypsum. At any rate, the use of plaster of Paris in decorative work increased with marvelous rapidity after 1550 or thereabout. The art was carried to Paris by Primaticcio (called by the French Le Primatice) and lavishly applied in the decoration of the famous Gallery of Francis I at Fontainebleau, under Serlio's supervision (about 1544). This Primaticcio had been employed at Mantua to continue and complete the work of Giulio Romano in the Gonzaga Palace. Giulio's and Raphael's assistant, Giovanni da Udine, who had completed the work begun or designed by Raphael in the Vatican, was employed in Florence and Venice and perhaps also on the exquisite decorations of the vault of the Piccolomini Library in Sienna Cathedral. He returned later to Rome and decorated the upper range of the arcades of San Damaso, above the Loggie; but plaster relief plays a quite unimportant part in the work of these upper arcades.

Interior of Vatican, Rome, Showing Decadence of Plaster Art

Another of Raphael's pupil-assistants, Pierino del Vaga, introduced the art of *stuccatura* into Genoa, founding an atelier there which continued after his return to Rome. The number of skilful artists in stucco increased rapidly. An extremely prolific worker in this line was Alessandro Vittoria (1525–1608), who labored especially in Venice and the near-by cities of Padua and Verona.

By 1550 the Italian art of *stuccatura* had spread through northern Italy and southward to Naples, and was practised by a host of artists of all grades of skill. It had already begun to lose something of its early refinement and exquisite delicacy, while taking on, with all the arts connected with architecture, more of the monumental quality. Owing to the cheapness and facility of its working it now began to take the place of carved marble and stone, and was increasingly used for ceiling decoration. In this function it rapidly grew in popularity, for by its means a massive masonry vault, richly carved, could be simulated in lath and plaster; while a deeply paneled or coffered ceiling could be produced by the same means without heavy timbers and costly wood carving.

This enlargement of the applications of plaster and stucco had various results, both good and bad. It greatly augmented the decorative resources of architecture. Many effects that had formerly been possible only at the cost of massive construction and expensive carving in marble, stone, or wood could now be produced at relatively small cost. The gain was great in the direction of internal splendor. So far as decoration may be considered purely as a matter of design, form, and color, without reference to material or structural significance, the new splendor was worthy of high praise. Distinguished artists bestowed their talents upon such decorations, and many of their works are greatly admired to this day. If a ceiling is to be considered as merely the decorative cover of a room, it is as legitimate to conceal its real con-



Side of Banquet Room Showing Plaster Work, Farnese Palace, Rome

struction behind it as to cover a floor with marble, mosaic, or carpets. The question of propriety begins to enter, however, when one imitates the appearance of costly materials in a cheaper one. A beamed ceiling in plaster that simulates wooden construction, or a coffered ceiling that simulates a paneled vault of masonry is a sham, and can be justified only by a splendor which overbalances the drawback of pretense. From this point of view the later plaster-work ceilings were better than the earlier ones, because they departed farther from their prototypes in wood or masonry. Many others are really decorations of true vaults, like the splendid barrel-vault paneling of the nave of St. Peter's, the ceiling of the Camera della Segnatura, or that of the Sala Reggia of the Vatican.

When, however, the fatal facility of plaster led to its use for monumental decorative sculpture, the rapid descent began toward the extravagant shams of the Baroque and Jesuit styles. Lorenzo Bernini (1598–1680) was probably the principal initiator of this movement. A vastly clever sculptor, extraordinarily prolific and an avowed imitator of Michelangelo, he outdid his exemplar in the dramatic attitudinizing of his decorative figures and was in turn followed and outdone by a host of technically clever imitators and successors. A rapid decline in taste supervened, fostered in part by the activity of the Jesuit order in building churches of ostentatious splendor, in which artistic sensationalism and shams of every kind were freely used, and tricks of perspective and *trompe-l'œil* effects were encouraged. The acme of sensationalism and the very bathos of true art were reached in the colossal altar-pieces of painted and gilded stucco, with massive clouds of glory and angels and cherubs in the most acrobatic attitudes, suggesting an explosion of dynamite quite as vividly as the glory of the Divine Presence. The protruding arms and legs of acrobatic angels, precariously seated on the narrow mouldings of the archivolts, disfigure the majesty of St. Peter's. Stucco draperies held up by plaster cherubs in the Vatican may amaze the ignorant, but they grieve the judicious.

Meanwhile stucco-relief had also been applied to exterior decoration, at first in the half-serious, half-playful *casini* and other structures of suburban villas; later to the façades of palaces and churches. The *casini* of the Villa Pia by Ligorio; the Villa Medici by Annibale Lippi, and the Villa Borghese by the younger Martino Lunghi or by Olivieri (?); the famous water-organ in the Villa d'Este at Tivoli, and countless other examples in Rome, Frascati, and elsewhere illustrate various phases of this development. These works are pervaded by an increasingly Baroque fancy which takes the place of the classic restraint and refinement of the earlier works. The technical execution is always excellent, and the quality of the stucco, which is never a pure gypsum, is attested by its admirable preservation through nearly or quite three centuries.

The most famous palace-façade in stucco is that of the Spada Palace in Rome, in recent years occupied by the Italian Senate. It was erected in 1540, but its charming reliefs of figures, festoons, and other ornaments may have been of later date. The near-by house of the goldsmith Crivelli, built in 1510, also has elaborate stucco ornaments. During the second half of the sixteenth century the practice became general of executing in stucco the mouldings and window dressings of palaces built of brick. This practice is now nearly universal in all the Mediterranean countries for ordinary buildings. It spread thence into Austria and South Germany in the seventeenth century; Vienna especially abounds in stucco façades of the seventeenth and eighteenth centuries.

In more northern climes the elements are less kind to stucco exposed to the weather and it is therefore chiefly confined to interiors. In England there was developed,

Stucco Decoration in Court of Spada Palace, Rome

as early as in the reign of Elizabeth (1558-1603), a remarkably interesting art of ceiling-decoration in low relief. At first pendants, in semi-Gothic style, were frequent; but these soon gave way to a very charming and perfectly rational system of all-over paneling with mouldings in low relief and arabesques or other ornaments in the meshes of the paneling. Hundreds of these seventeenth and eighteenth-century ceilings exist today in perfect condition. The reader is referred to Bankart's interesting work, "The Art of the Plasterer" (Batsford, London, and Scribner's, New York), for abundant illustrations of examples of these early English ceilings.

Detail of Ceiling, Sizergh Hall, Westmorland, England

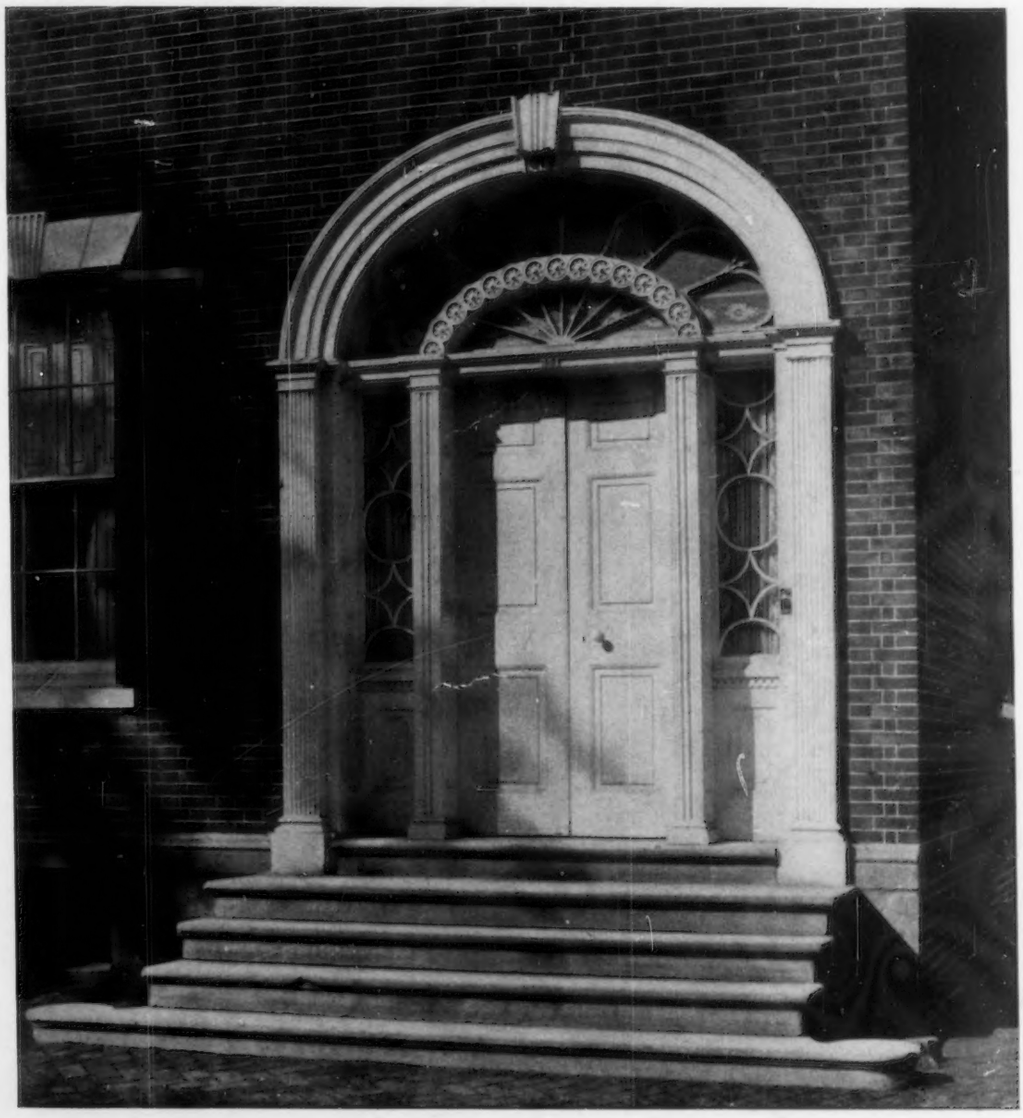
Toward the end of the eighteenth century the work of the brothers Adam introduced a new element of classic refinement, which was reflected in this country in some of the ceilings of the end of that century (*e.g.*, in the Massachusetts State House by Bulfinch) and of the early nineteenth. It had affinities with the Louis Seize style in France, and marked a sudden reaction from the artistic license of the Louis Quinze, the Baroque, and the "Zopfstil" which had run riot in France and Germany, though it had appeared only sporadically in England. This was the last flickering of the Renaissance in plaster work, which soon fell into the hands of inartistic workmen controlled by purely commercial agencies.

I have skimmed over the mere surface of a great subject, and leave to Mr. H. Desmond Upton, in a following issue, the discussion of the later and more modern aspects of the art. Perhaps, slight as has been this sketch, it has suggested at least the past importance and the potential resources of an art which it is in the power of our architects and decorators to restore once more to the rank which belongs to it in the field of modern architecture and creative design.

Ceiling from the Old Palace, Bromley by Bow, England

THE BRICKBVILDER COLLECTION OF
EARLY AMERICAN ARCHITECTURAL DETAILS

PLATE THIRTY-TWO



THIS house is termed the "Lafayette House," as General Lafayette was lodged and entertained in it on his last visit to Alexandria in 1824.

The designer of this house was especially fortunate in securing the fine proportions of the doorway and the rich effect produced in its setting in the brickwork. The shapes of the door panels and contours of mouldings throughout the doorway are excellent. The fluted pilasters supporting the moulded elliptical arch give the effect of great strength without clumsiness. The moulded nosing of the stone steps, so prevalent in Alexandria Colonial work, continues the scale of the doorway to the sidewalk.

DOORWAY OF THE LAFAYETTE HOUSE, ALEXANDRIA, VA.

Built between 1820 and 1824

MEASURED DRAWING ON FOLLOWING PAGE

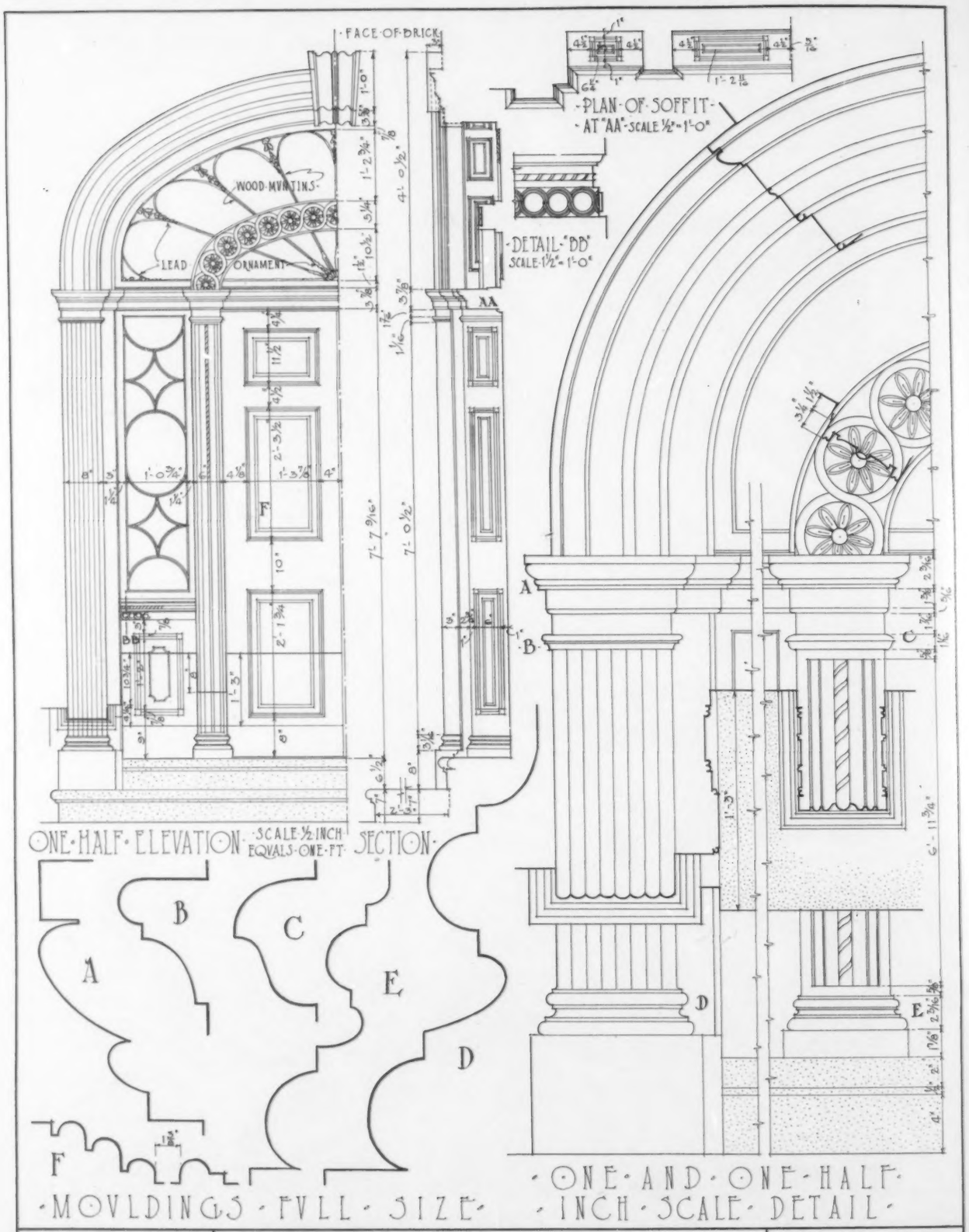


PLATE ~ 32 NOVEMBER 1916	DOORWAY ~ LAFAYETTE ~ HOVSE ALEXANDRIA VA DATE 1820 ~ 24 BVILT BY THOS LAWRASON	MEASVRED & DRAWN BY J L KELSTER ~ O J MVNSON & J A WEBER

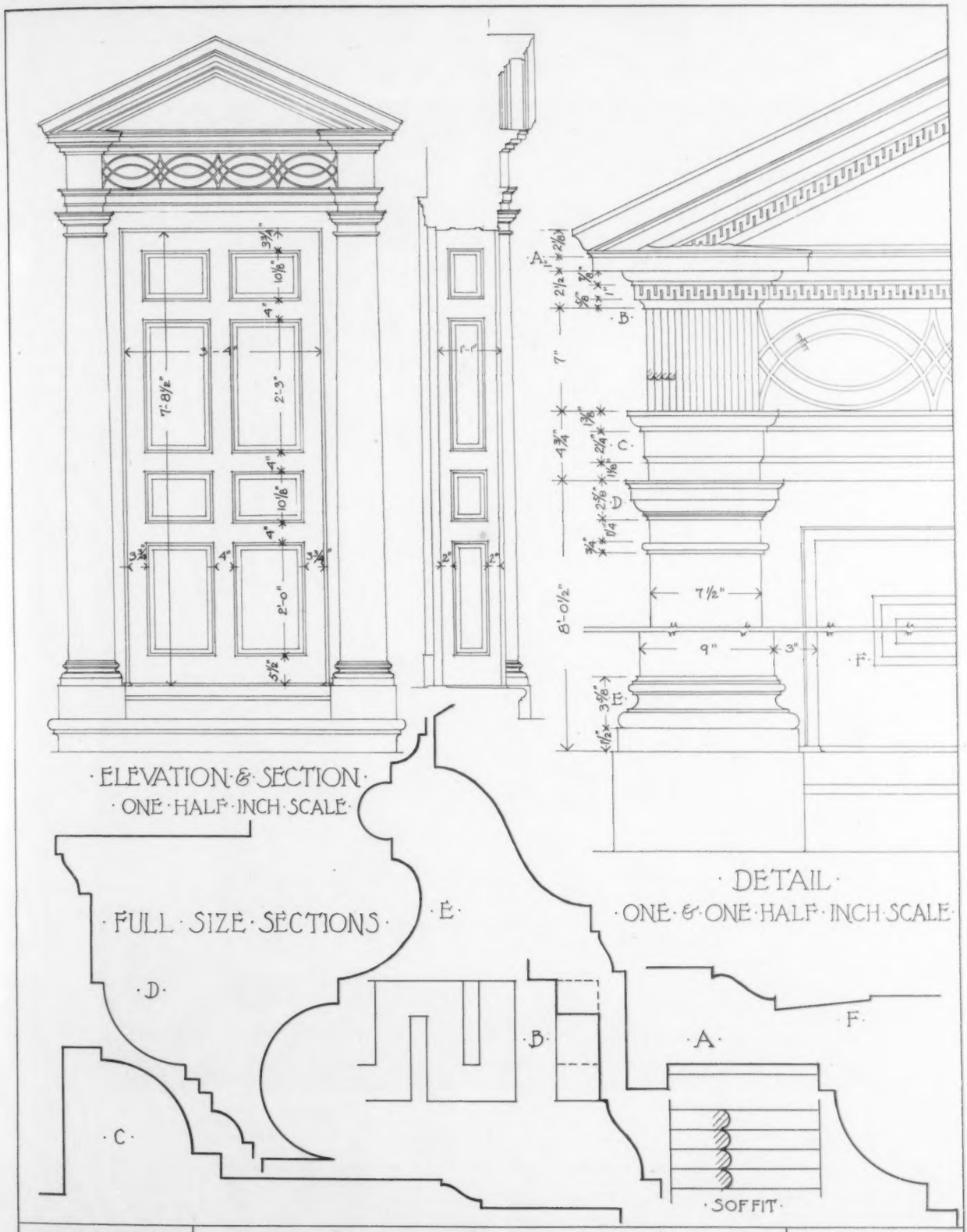


PLATE 33	DOORWAY · JOHNS · HOUSE	MEASURED & DRAWN BY
NOVEMBER 1916	BUILT 1790 PETER JUSTIS ARCHT NEW CASTLE DEL	RIGGIN BUCKLER

PLATE THIRTY-THREE

THE Johns House was built in 1790 from the plans of Peter Justis of Wilmington, Del. The original plans and a quaint letter from the architect soliciting the work are preserved by the present owner. George Vansandt and Joseph Baldwin were the builders. The detail of this doorway might well have been taken from one of Pain's "Companions" or "Pocket Treasures" which were used by many of the architects and master builders of that period. Its proportions are graceful and in its mouldings and composition it is typical of the best in Colonial architecture.

DOORWAY OF THE JOHNS HOUSE, NEW CASTLE, DEL.

Built in 1790

MEASURED DRAWING ON PRECEDING PAGE

The Observations of a Draftsman

By FILUPO BRUNELLESCHI

ON the fourth floor of a rather old fashioned building in the city of New York is a suite of offices, the entrance door to which bears on its plate glass panel the name of one of the best known architects in the country. Inside is the usual arrangement of rooms — a public office where sit four or five stenographers, a finely equipped library, a private office haphazardly decorated with sketches, renderings, photographs and models, fragments of ornament, casts, books and magazines, bronzes and marbles, Persian rugs and ancient altar cloths and the thousand and one bits of detail that an architect picks up in the course of a long career. There is the file room where are hung the drawings of several hundred buildings, and finally the big drafting room which at times accommodates a score or more of men.

Here I have spent five years in service, five years in working over all the problems that come the way of a general draftsman in a fair sized office. There has been pleasure for me and there have been disappointments; there has been commendation — occasionally — for my efforts, and there has been censure — occasionally — for my errors. Whether I have deserved more of either than I have been given does not enter into this discussion. It is enough that I have reported at nine, done the day's work, gone home at five, and drawn my pay on Saturday — and observed.

It is with these observations that we have to do. I have seen the things that have made the office famous, and I have seen the things that have retarded its progress, hampered its success, and — from a purely business standpoint — lessened its profits. If the office were a marked exception from the general run of offices there would be little use in my writing this review, but I do not believe that to be the case, and it is with the hope that architects may read and perhaps profit thereby that I venture to set down my experiences.

It is difficult to discuss men without using names; therefore, for the sake of convenience, we will call the architect himself Smith, and his three lieutenants Black, White, and Gray. Mr. Smith — we sometimes call him the Governor — rarely used a drawing pencil except in the making of thumbnail sketches now and then, at which he was an amazingly rapid worker. His work was largely confined to the entertaining — the word is used advisedly — of clients, and parleying with contractors when the problem seemed too difficult for his subordinates to handle. Mr. Black might have been termed financial manager and general overseer of outside work; White was the designer, a Beaux Arts man, interested solely in the artistic side of his profession. Gray was head draftsman.

In the early days of my service I wondered at the amount of work that came into the office and the apparent ease with which it was secured, and I soon attributed it in a large degree to the personality of the governor. He was a thorough diplomat. An excellent conversationalist, educated, well read; he had that rare ability to talk intelligently and entertainingly with any man. I have frequently heard him say that to be successful an architect must be well versed in all branches of the fine arts; that a man who cannot appreciate good music cannot fully appreciate good architecture. He made friends easily and frequented clubs and societies where desirable acquaintances might be cultivated. To this, as much as to his professional ability, I laid his ability to get big commissions.

In the matter of getting out preliminary sketches he used a discretion that is sometimes lacking. For the real estate promoter who looked at all things from a cold business standpoint, plain business-like sketches were furnished, sometimes no more than rough plans colored in with a red pencil; but if the client seemed likely to be attracted by highly decorative drawings White was permitted to amuse himself for a day or two with water colors and gold tape.

Withal there were many things that a draftsman might have learned to his profit, but there were flaws, costly flaws, in the running of the office, and it is with them that I shall henceforth concern myself. Perhaps it is safe to say that we learn more from the errors that we note than from the successes that we observe without comment. The business was a success — that is to be admitted; but I soon learned that with better management the profits might be materially increased.

The greatest fault may be described as lack of teamwork among the powers that governed. A dozen times I have heard a new draftsman exclaim, "Who is the head of this drafting room?"

A man would be assigned to a new job. White would give him a few instructions and he would prepare his drawings under the occasional supervision of Gray. Then, when his work was well along, Black would look at it and straightway announce, "That's not the idea at all." Gray would be summoned, and forgetting the fact that it had been his job to keep his eye on the draftsman would join Black in criticism. The draftsman, nettled, would start again on a clean sheet, or "to save time" would spend half a day in erasing his innocent errors. Then, when he had finally satisfied the two lieutenants, Mr. Smith himself would saunter in, study the drawing and remark, "That's very pretty, but it's not right." Hours, days wasted because the triumvirate in command of the drafting room didn't know in the first place what was required.

How different from another office in which the head draftsman, now a member of the firm, made it his practice to devote an hour each day, outside of office hours, if necessary, in studying the requirements of the problems in hand, and then, the first thing in the morning, assuring himself that every draftsman understood exactly what his day's work was to be. Machine-like efficiency, perhaps, but worth while, and it may be added that the man was liked and respected by his subordinates.

The second flaw in our office management is illustrated by an incident which occurred when a number of new men were hired at a particularly busy time. We were

hard at work just then on a large bank building. At the same time we were preparing sketches for a Gothic church. Now it happened that several of us had had considerable experience in church designing, while one of the new men had come to us from an office noted for its banks. The logical thing would have been to put the new man onto the bank work and to permit one of us to make the sketches, which we could have done in a few days. What did happen was just the reverse. The new man was assigned to the church, and finding himself up against an unfamiliar problem was obliged to take two or three times as long as one of the rest of us would have required besides calling us in occasionally to help him. For him it was valuable experience, but for the firm a costly piece of mismanagement.

It was not long after this that it became necessary to rush through a set of drawings — "every drawing done by May first." When a week or more had gone by it became evident that the force of men then employed could not do the task in the allotted time. It could have been done if each man had put in two or three evenings a week, but we were not supposed to put in overtime except by request and we were not then requested. The firm decided to hire new men. Obviously a new draftsman, unfamiliar with his problem, will accomplish less in a given time than one who has worked on the drawings from the start. On May first the work was not completed, and it was decided to ask the men to work nights. Here again the policy of the office interfered with its work. Almost any draftsman is willing to do extra work occasionally, but when he is required to work nights he has a right to expect pay for it; if not "time-and-a-half," at least at his regular rate. In our office, however, we were seldom paid directly for overtime. Instead, we kept account of our time, and later, when the rush was over, we were allowed a vacation equivalent to the time we had worked. Fair enough sometimes, but there are times when a man needs the money more than he does the vacation. Moreover, it meant an actual loss to some of us; we were obliged to buy our suppers which meant an extra expense to those of us who otherwise would have gone home. We frequently found that in the course of a *charette* we were paying two or three dollars for the privilege of adding a few days to our vacations, perhaps three months hence.

It is an undeniable fact that a contented draftsman will produce more work and better work than one who thinks he is justified in finding fault with the conditions under which he is employed. Mr. Smith's men might have been divided into two general classes — the older men, men of eight or ten years' experience or more, and the younger fellows, boys of eighteen or twenty, still in their student days. That these younger draftsmen should be given every opportunity to develop their talents was perfectly fair, and the more experienced men were always ready to help them with advice and criticism, but sometimes we thought that the thing was being carried to extremes. The crisis came when one of the best men we had gave notice that he intended to leave. The Governor asked the reason for his sudden departure, and the reply was, "I have spent fifteen years learning to be a designer and I'll be hanged before I'll waste my time tracing foundation plans while the office boy does the designing." It may sound like a case of injured pride, but we all felt that the man was justified; even the office boy designer agreed with us — he had been given a task beyond his ability and he knew it. It was simply an example of the tactless method we had of assigning work, and it resulted in the loss of a valuable man.

Every office suffers from the failure of some of its draftsmen to appreciate the true value of their work. There is always the draftsman who omits structural details whenever possible on the supposition that the builder will know better than he does how to build them. Then there is the fellow whose ambition to produce a beautiful drawing so absorbs his attention that he loses sight of the fact that he is doing a detail for the sole use of a few workmen and not for exhibition purposes.

I recently saw a drawing made by just this sort of draftsman. It was a three-quarter inch scale detail of an entrance to a public building. The man had actually drawn more than 8,000 individual bricks! What a wonderful exhibition of human patience and perseverance — but where was the head draftsman while the artist was thus amusing himself?

From my experience in trying to analyze the leakage of time and energy in Mr. Smith's office, I am inclined to believe that more time is wasted in the making of details than in any other way. The Governor frequently criticized us for our methods of making scale details. "Remember," he would warn us, "you are making that drawing for the metal worker; don't waste time showing wood, and plaster, and marble trim." We listened and obeyed, but we sometimes felt that his criticism was not well founded. One carefully drawn sheet showing all materials in their correct relations to each other would have been of more value to the contractor than half a dozen separate drawings and would have saved much of our time. What we were making was really a series of shop drawings which the subcontractors sooner or later made over in their own way.

The Governor seldom concerned himself with the interests of his men outside of office hours. The more ambitious of the younger fellows spent their evenings in the ateliers, and were cheerfully granted the use of the office library to aid them. Mr. Smith didn't take the stand that a few architects have taken, that a draftsman cannot work in an office during the day and study evenings without neglecting one or the other — or both. Atelier training was encouraged as something of material benefit to the office.

It is not the student whose outside work enters into my criticism, however; it is the draftsman who tries to build up a practice for himself while still an employee. In Smith's office we seldom accepted a job amounting to less than $15,000 or $20,000 unless the Governor felt obliged to do so for diplomatic reasons. Consequently when one of the draftsmen had a chance to do a small house or garage he didn't turn it over to the office but made the drawings himself in his spare time — a practice that the office not only countenanced, but to some extent encouraged. The men benefited by it not only financially, but they were getting excellent experience.

The danger of the practice, however, lies in the abuse of it, and in Mr. Smith's office it must be confessed certain of the men abused the privilege to a great extent. One man in particular had built up such a practice of his

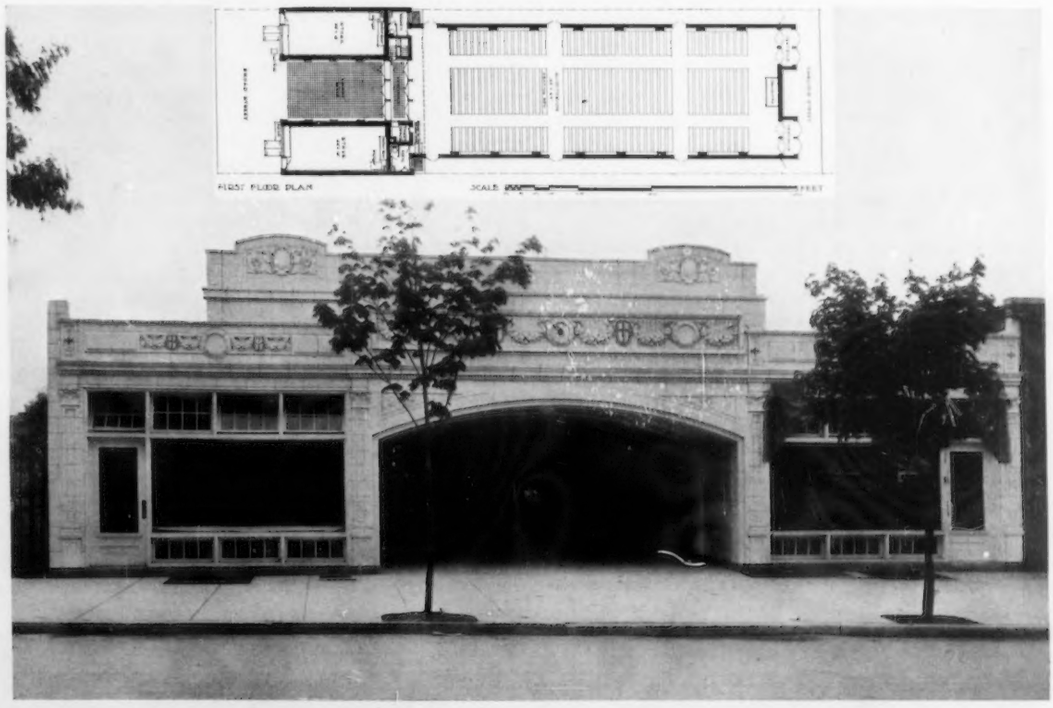
own that he was actually robbing the firm of work; schools, small theaters, and commercial buildings that ought to have been regular office jobs he captured under the very eyes of the Governor, and to crown the feat the man actually had the audacity to lug home office-supplies — paper, tracing-cloth, and pencils — wherewith to make his drawings.

I would not discourage the draftsman who can add to his income as well as to his experience and knowledge of the practical things in architecture by an occasional bit of work of his own, but to the architect who encourages the practice in his employees I would respectfully suggest that he watch out for the sort of man I have described — his genus is not rare — and if he finds him, either take him into the firm in self-defense or else part company with him.

I might go into numerous other topics; the way in which the head draftsman and the specification writer worked in utter independence of each other, a state of affairs which resulted in numerous discrepancies in plans, necessitating erasures and corrections; the Governor's habit of demanding the drawings on a given date and then ignoring them for a week or more, until we learned to discount his demands so that when he really wanted a drawing on time he had difficulty in getting it; and White's custom of permitting a draftsman to do sheet after sheet of ornamental detail as he pleased, and then blue penciling the entire lot, changing mouldings in their entirety until the draftsman in disgust was prone to tear up his work and start anew, whereas five minutes' criticism at the right time would have saved time and money.

I have wondered sometimes to what extent these unfortunate conditions exist in other offices. Smith's is not the only office that is losing money by mismanagement. A well-known architect has said that the ideal office is that in which there are no draftsmen; he may be right. But granting that draftsmen are sometimes necessary evils, the greatest possible efficiency can be attained only when the drafting room is under the supervision of one capable head man, and, if I may add one more condition, when the architect himself is in sufficiently intimate touch with his office to know whether or not his ideas are being properly carried out; whether, in short, his lieutenents are efficient directors.

I ask the architects who have been patient enough to read this article through to the end not to brand it merely a published grievance of a disgruntled draftsman; I have tried to make it a fair criticism from the standpoint of the employee. If only a few of the readers stop to ask themselves whether the criticisms enumerated in this paper strike home I shall consider my attempt justified.



MOTION PICTURE THEATER AND STORE BUILDING
LOGAN, NORTH PHILADELPHIA, PA.

ALBERT F. SCHENCK, ARCHITECT

EDITORIAL COMMENT AND NOTES FOR THE MONTH

IN a recently issued statement, George B. Ford, consultant to the commission on building districts and restrictions in New York describes the new Zoning Law recently put into effect by a virtually unanimous vote of the Board of Estimate and Apportionment. Although in some individual instances this new law may work damage to isolated holders of property it is undoubtedly a great step toward placing the development of New York on a firmer and more rational basis than has previously existed. Its application and results will afford other American cities and all interested in the ideals of town planning a special opportunity to study municipal growth under proper restriction, but in considering its application to other centers it must be borne in mind that it contains many unduly liberal provisions, necessitated by the exceptional economic conditions of New York which, if adopted without change might tend strongly to defeat the object of the law in another community.

In general, the law will limit the height of buildings in proportion to the widths of the streets on which they face, all the way from two and a half times the width of the street in the financial district, through two times the width of the street in central Manhattan, with one and one-half times in the balance of Manhattan and in small portions of the other boroughs, down to once the width of the street throughout all the rest of the city. A future Equitable building could only be a third as high because it faces on narrow streets, but a tower in the center of it, half as large again as the Woolworth tower, might rise to any height. The Woolworth building on the other hand, if facing on a park, might be very nearly duplicated. Twelve and fourteen-story apartments will continue to go up on the main avenues, and eight and nine-story apartments on the side streets. Throughout most of the city, however, four or five stories will be the limit. Towers may be built to any height but they cannot cover more than a quarter of the lot. Mansards, dormers, and terraces are encouraged to bring light down into the streets by making the upper part of the buildings above a reasonable height set back from the building line.

The size of buildings will be controlled by the fact that the law requires certain open space on each lot. This again ranges all the way from the warehouse districts along the commercial waterfront and along the freight railways where a building may cover the whole of its lot, through the B, C, and D districts, so called, in each of which in succession a building must provide for larger and larger yards and courts, down to the villa districts where a house can cover only 30 per cent of its lot and must be widely separated from its neighbor on at least one side. Everywhere the courts have to be increasingly larger at the top as a building goes up in height, so much so that this requirement tends to limit the practicable economic height of buildings even more effectively than do the requirements directly affecting their height.

The location of buildings must be determined by their use — there are two general classes of restrictions; first, the districts which are restricted against business and industry of all sorts, the so-called "residence" districts; and second, the tracts which are restricted only against manufacturing and public stables and garages, the so-called "business" districts. In the former almost any kind of building that people live in is allowed, also churches, schools, hospitals, and various institutional buildings. In the business districts any residence use is allowed and even a certain small proportion of the unobjectionable types of manufacturing.

All of the balance of the city which is not in one or the other of these two kinds of districts is left unrestricted. It includes all of the land appropriate for industry along the navigable waterfront and along the freight railways, as well as most of the territory which is now given over to manufacturing. It includes also scattered throughout the city a number of blocks which are already invaded by public garages or which are appropriate for that use.

Despite the preponderating sentiment in favor of the plans as finally adopted and the almost unanimous feeling that districting was desirable, it was realized that the law or some parts of the zone maps might be taken into the courts. As the law will be administered under the police power of the state, without compensation to property owners when they may feel that they are damaged, the Commission felt that it was highly important that the law and the district lines should be such as the courts would be likely to uphold as a proper exercise of the police power.

In the various reports of the Commission nothing whatever has been said about the effect of the new law on the appearance of the city but within the next twenty-five or fifty years it is bound to make the city far more orderly and even more beautiful. Some have thought that it would spoil the glorious sky line of New York and rob the city of its "crowning glories." But so far from doing that, the sky line of New York in future years will be more wonderful than anything yet dreamed of, for the law is full of special provisions which are bound to encourage the erection of towers, dormers, terraced roofs of a variety and interest far different from anything which this country has yet seen. More immediately it will put order and harmony into the streets of the city, particularly those of the residential district.

Ultimately one of the greatest effects of all will be that on family life and citizenship, for as the character of the neighborhoods becomes assured families will begin to remain in one place instead of constantly shifting about as they do now. Local ties will be formed, neighborhood spirit will grow; social and community consciousness will develop and people as groups will take greater interest in the affairs, both social and civic, of their neighborhood.